UNITED FRUIT COMPANY

General Offices: Boston, Massachusetts

MEDICAL DEPARTMENT

NINETEENTH
ANNUAL REPORT

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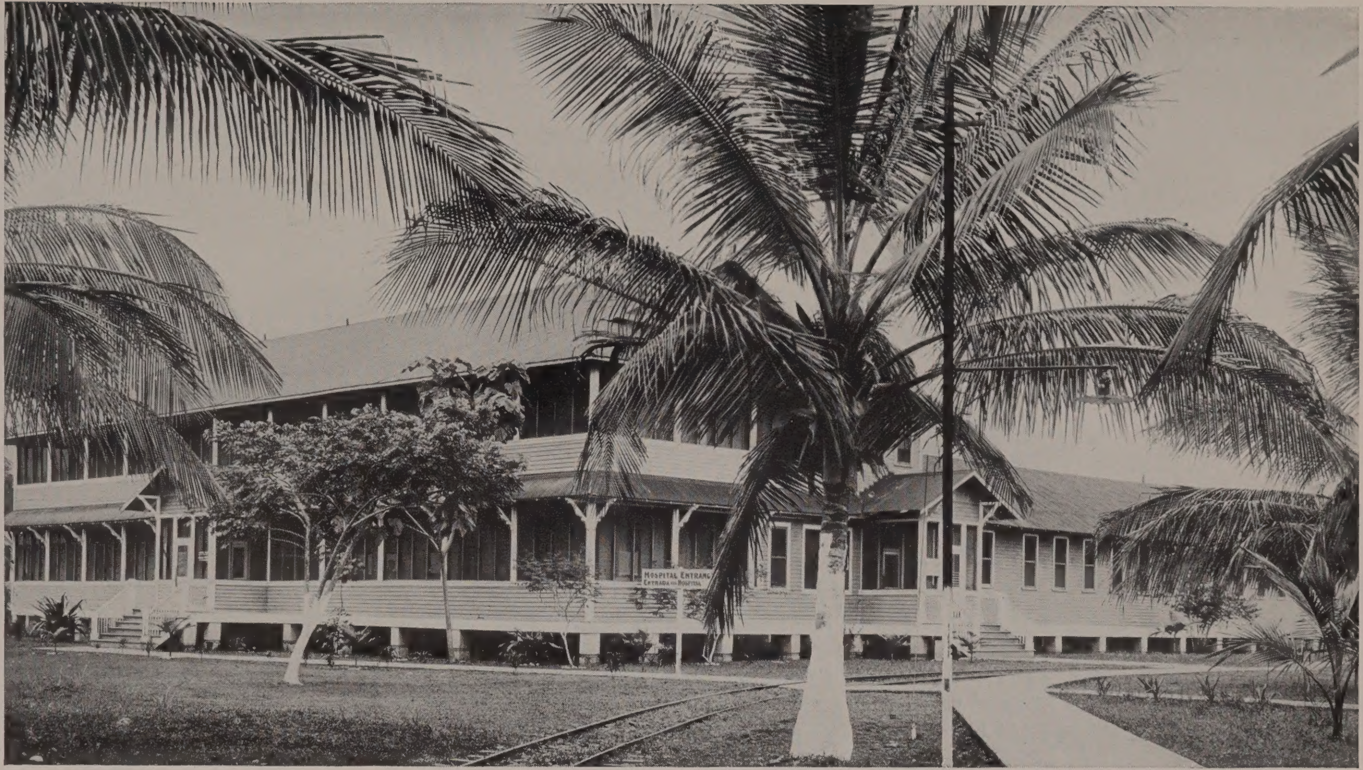
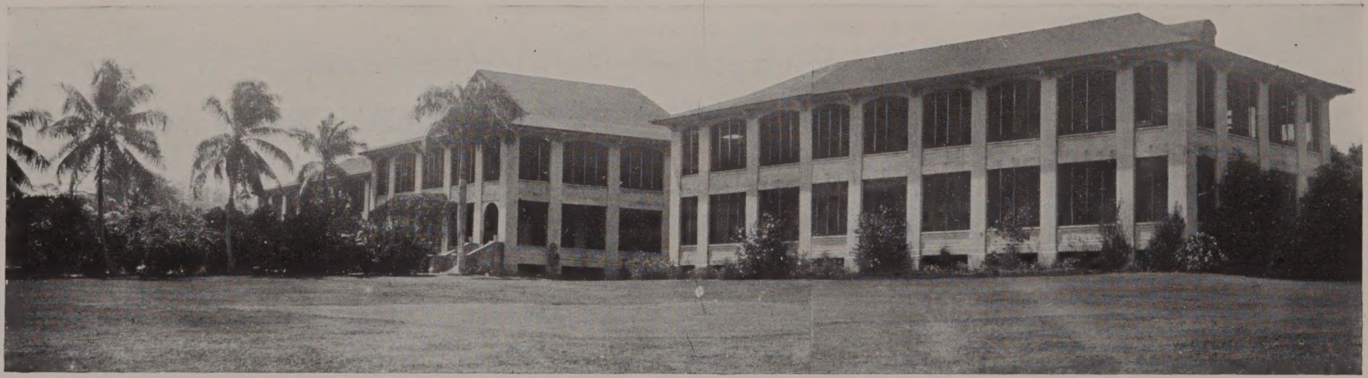
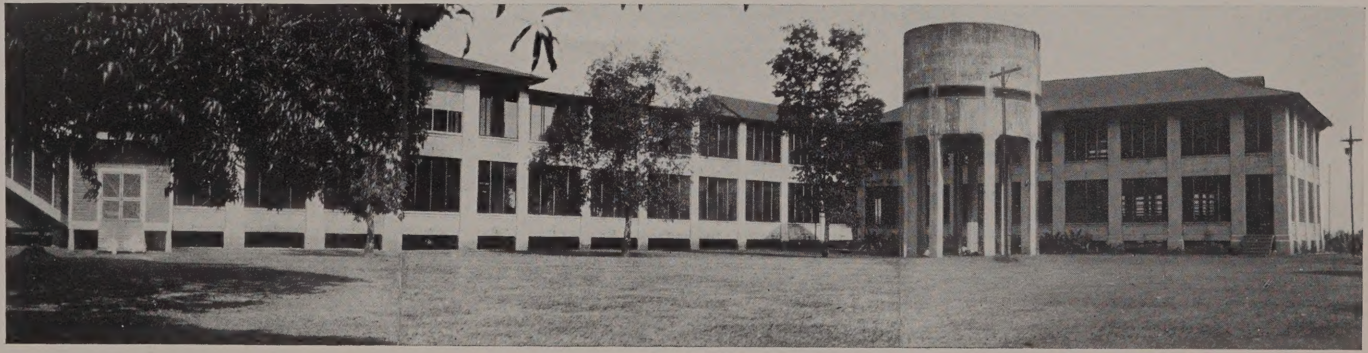
United Fruit Company Hospital at Port Limon, Costa Rica



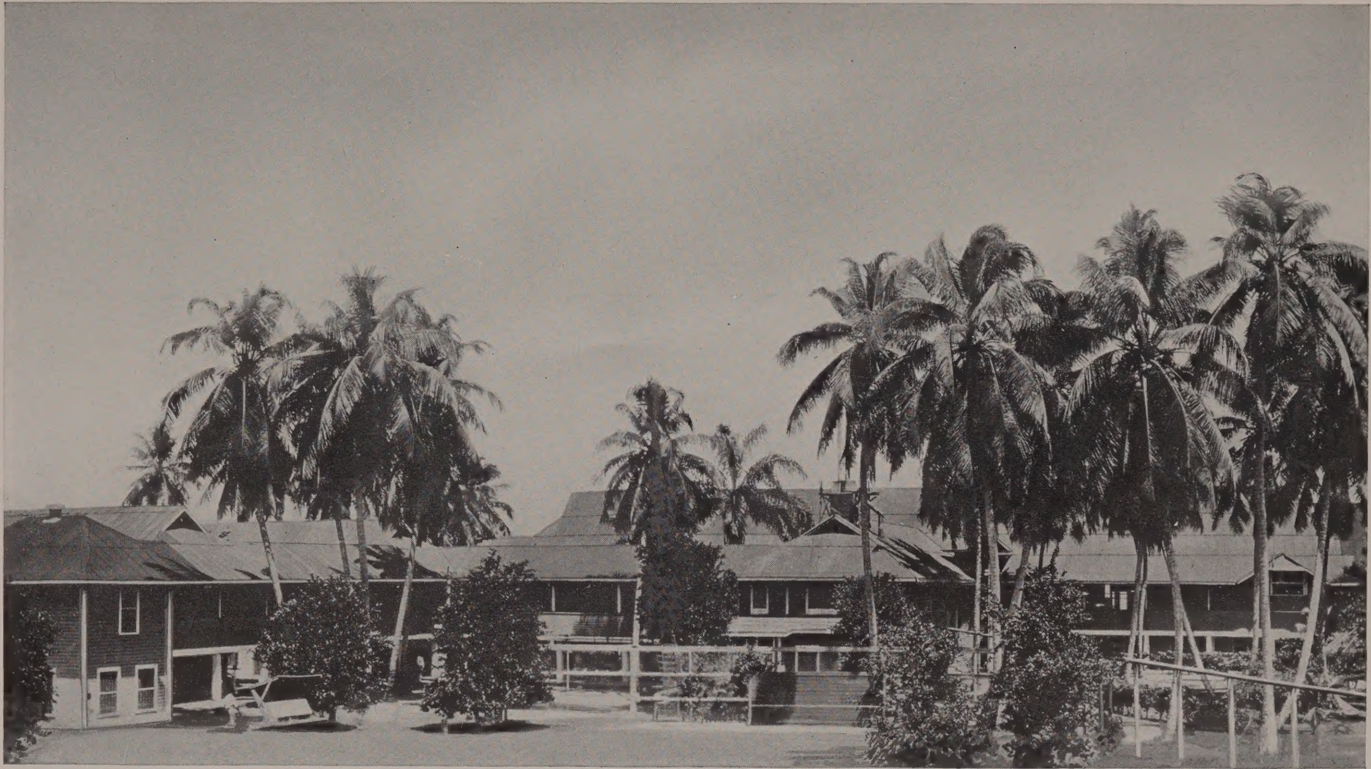
UNITED FRUIT COMPANY HOSPITAL AT ALMIRANTE, PANAMA



United Fruit Company Hospital at Quirigua, Guatemala (Front View)



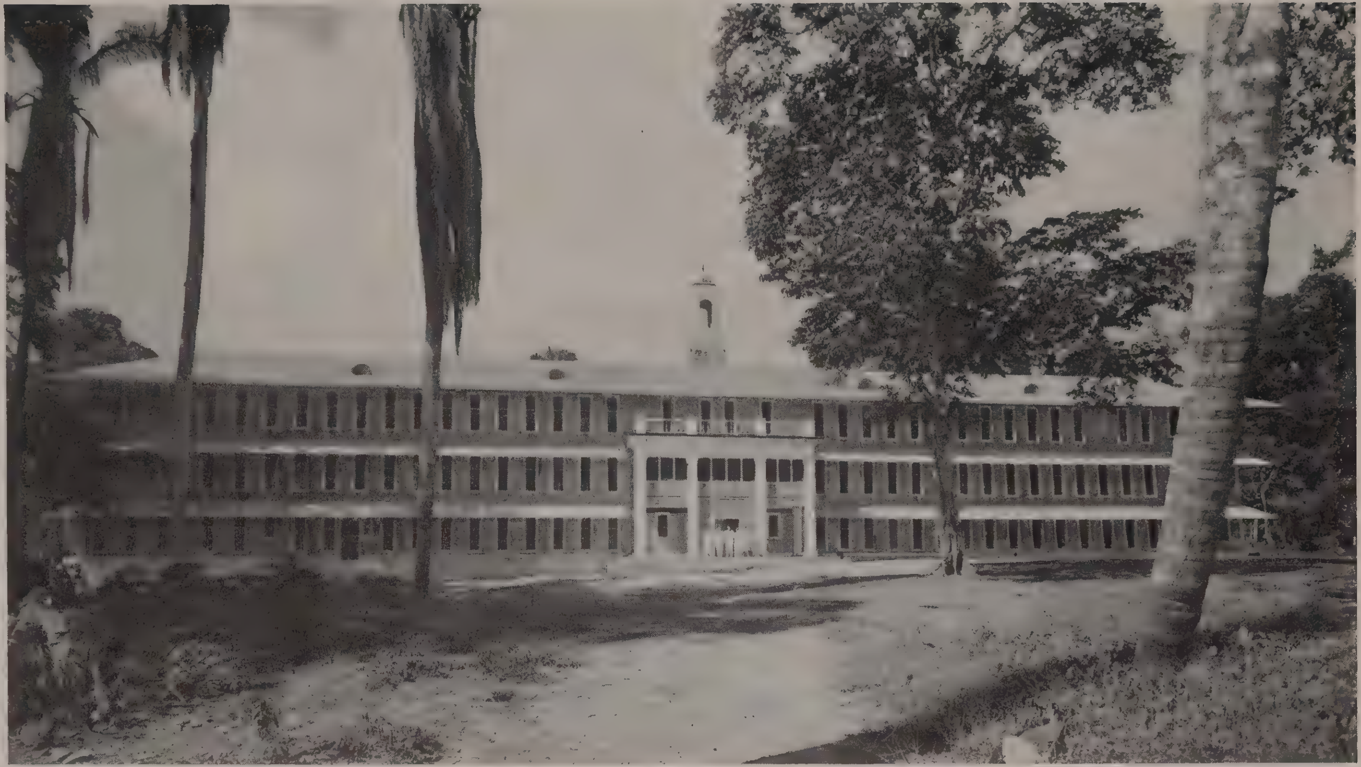
United Fruit Company Hospital at Quirigua, Guatemala (Rear View)



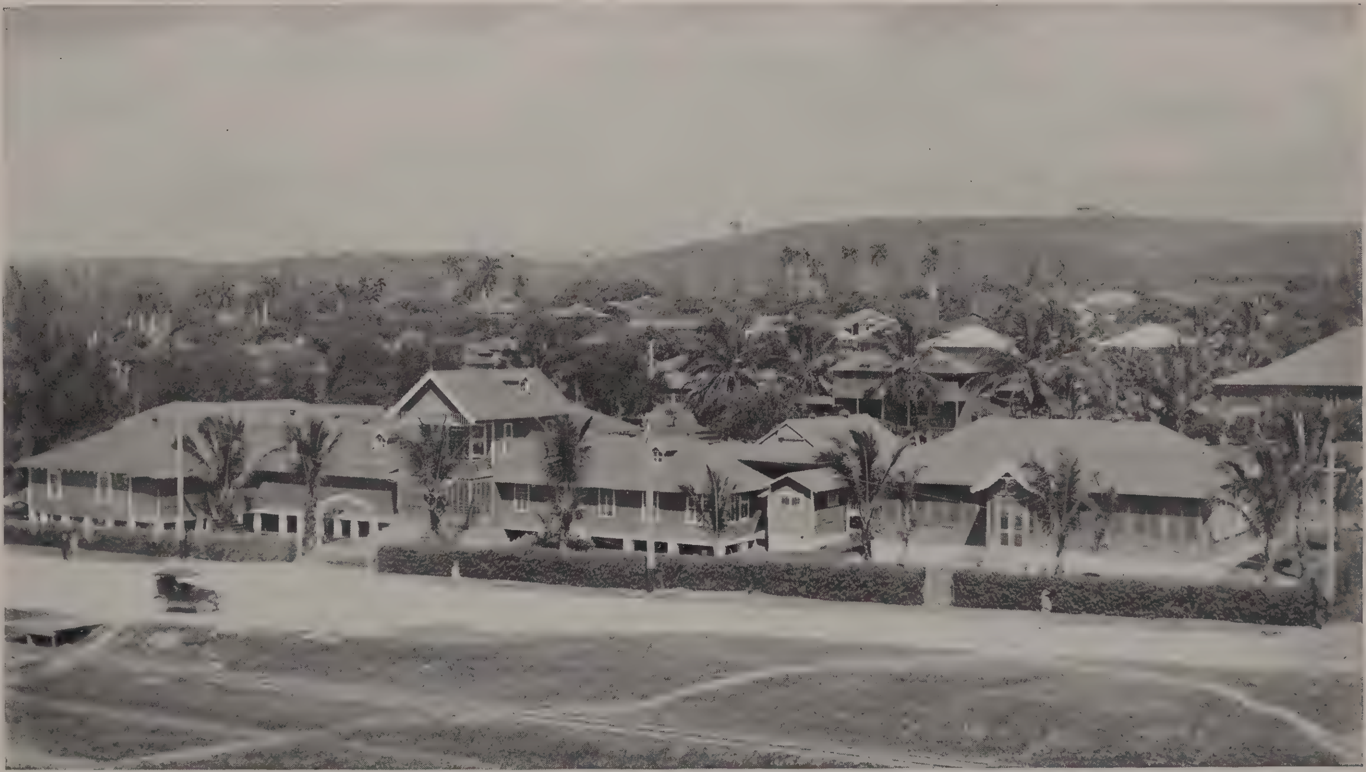
Tela Railroad Company Hospital at Tela, Honduras

REAR VIEW—FOLIAGE PREVENTS OBTAINING SATISFACTORY FRONT VIEW

Truxillo Railroad Company Hospital, Puerto Castilla, Honduras



Chiriqui Land Company Hospital at Puerto Armuelles, Panama

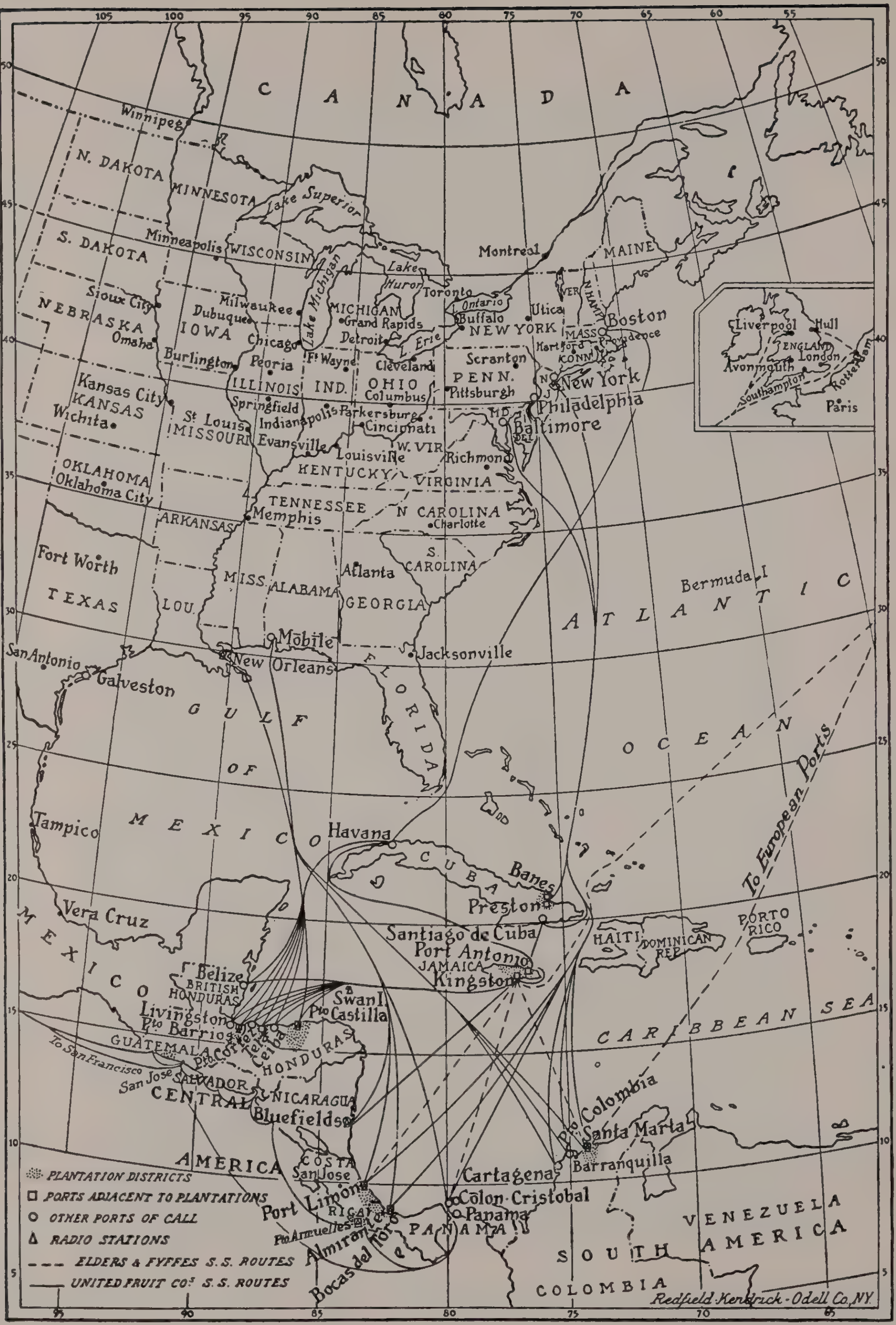


UNITED FRUIT COMPANY HOSPITAL AT BANES, CUBA

United Fruit Company Hospital at Preston, Cuba

United Fruit Company Hospital at Santa Marta, Colombia

New Emergency Hospital and Dispensary of United Fruit Company, at Sevilla, Colombia


CANADA
ATLANTIC OCEAN
GULF OF MEXICO
CARIBBEAN SEA
MEXICO
CENTRAL AMERICA
SOUTH AMERICA
To European Ports
To San Francisco
Winnipeg
Minneapolis
Milwaukee
Chicago
Montreal
Toronto
Buffalo
Boston
New York
Philadelphia
Baltimore
Richmond
Pittsburgh
Cincinnati
Louisville
Memphis
Atlanta
Mobile
New Orleans
Jacksonville
Galveston
San Antonio
Tampico
Vera Cruz
Havana
CUBA
Banes
Preston
Santiago de Cuba
Port Antonio
JAMAICA
Kingston
HAITI
DOMINICAN REP.
PORTO RICO
Bermuda I
Belize
BRITISH HONDURAS
Livingston
Pto Barrios
Pto Cortez
Tela
Ceiba
Pto Castilla
Swan I.
GUATEMALA
HONDURAS
SALVADOR
San Jose
NICARAGUA
Bluefields
COSTA RICA
San Jose
Port Limon
Pto Armuelles
Almirante
Bocas del Toro
PANAMA
Colon-Cristobal
Panama
Cartagena
Barranquilla
Santa Marta
Pto Colombia
COLOMBIA
VENEZUELA
Liverpool
Hull
ENGLAND
London
Avonmouth
Southampton
Rotterdam
Paris
PLANTATION DISTRICTS
PORTS ADJACENT TO PLANTATIONS
OTHER PORTS OF CALL
RADIO STATIONS
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SPECIAL COMMENT

The author of each paper is afforded an opportunity to give free expression to his own ideas on the subject of the article, and it is understood that he is solely responsible for the opinions expressed and the statements made therein.

SECTION I

UNITED FRUIT COMPANY
MEDICAL DEPARTMENT

WILLIAM E. DEEKS, M.D.
GENERAL MANAGER

R. C. CONNOR, M.D.
ASSISTANT GENERAL MANAGER

CABLE ADDRESS
UNIFRUITCO, NEW YORK

Pier 3, North River,
New York, N. Y.
May 1, 1931

MR. V. M. CUTTER, President
United Fruit Company
Boston, Massachusetts

Dear Sir:

The Annual Report of the Medical Department of the United Fruit Company for the fiscal year ended December 31, 1930, is herewith submitted.

In line with the general programme of economy made necessary by the world-wide economic depression, it was necessary to reduce the size of this Report to conform therewith. Consequently, we are unable to incorporate a number of articles which were submitted for publication, nor to include illustrations similar to those which have heretofore been inserted annually to show activities associated with sanitation, welfare work, and preventive and curative medicine.

During the past year some changes have taken place in the personnel of the Medical Department. Among these are the appointment of Dr. M. D. Rojas as Superintendent of the Chiriqui Land Company Hospital in place of Dr. H. M. Walker who resigned, and the reinstatement of Dr. F. C. Watson as Superintendent of the Hospital in the Cortes Development Company Division in place of Dr. Alfred Gage who resigned.

We assumed responsibility for the supervision of the Medical Department of the Cortes Development Company, in 1930; and a brief summary of the activities of that Department appears on pages 15 and 16 of this report.

No original research work was undertaken during the past year by people outside of our organization; but several of the articles which are being published in this Annual Report refer to special investigations made by the members of our own staff, and particularly to the developmental work connected with the control of malaria and the improvement of the health of the laboring population.

Three incipient epidemics of smallpox occurred in the Costa Rica, Colombia, and Truxillo Railroad Company Divisions; but they did not become serious, as prompt precautions were taken to prevent the spread of the infection.

We are indebted to Dr. F. W. O'Connor, of the Columbia School of Tropical Medicine; and to Dr. W. M. James, of the Herrick Clinic, Panama, for important contributions to our Annual Report. Dr. H. C. Clark, Director of the Gorgas Memorial Laboratories, has given us permission to utilize several papers which had appeared previously in medical journals but which are of sufficient importance to justify republishing them for the information of those who receive our publication.

The thorough coöperation of all other Departments of the Company has assisted us greatly in our efforts to maintain satisfactory hygienic and sanitary conditions, and we wish to take this opportunity to express our sincere appreciation.

Respectfully

W E Deeks

COMMENTS ON SOME OF THE MORE IMPORTANT DISEASES OCCURRING IN THE TROPICAL DIVISIONS

MALARIA

During recent years considerable progress has been made in the treatment of malaria, particularly since plasmochin was introduced into this country. It was made synthetically by Schulemann, Schonhofer and Wingler, who now state that its composition is: N-diethylamino-isopentyl-8-amino-6-methoxy-quinoline.

Plasmochin is at present marketed in the following forms:

A. Tablets

(1) Plasmochin Simplex. Each tablet contains 0.02 g. (gr. $\frac{1}{3}$) plasmochin.

(2) Plasmochin Compound. Each tablet contains 0.01 g. (gr. $\frac{1}{6}$) plasmochin and 0.125 g. (gr. 2) quinine sulphate, (plasmochin 1 part and quinine sulphate, 12$\frac{1}{2}$ parts).

(3) Chinoplasmin. Each tablet contains 0.01 g. (gr. $\frac{1}{6}$) plasmochin and 0.3 g. (gr. 4$\frac{1}{2}$) quinine sulphate, (plasmochin 1 part and quinine sulphate 30 parts). They are also procurable in tablets containing one-half and one-fourth of these amounts, respectively.

B. Solutions for Hypodermic Use

(1) Plasmochin Simplex: in ampoules of 1 and 3 c.c. each. 1 c.c. contains 0.01 g. (gr. $\frac{1}{6}$) plasmochin.

(2) Chinoplasmin in ampoules of 2 c.c. each, containing 0.02 g. (gr. $\frac{1}{3}$) plasmochin and 0.6 g. (gr. 9) quinine sulphate.

It is now generally believed that quinine and plasmochin produce different therapeutic effects on the schizonts and gametocytes respectively of the three species of malaria. Dr. W. Schulemann summarizes the effects of plasmochin as follows:

> "Tertain malaria. The schizonts and gametocytes of *plasmodium vivax* are destroyed by daily doses of 0.06 g. (gr. 1) pure 'Plasmoquine' (1 tablet 'Plasmoquine' Simplex—0.02 g. or gr. $\frac{1}{3}$ 'Plasmoquine').
>
> "The fever generally disappears on the second, very rarely as late as the third, day of treatment.
>
> "On an average the parasites are no longer demonstrable in the blood after 3 to 4 days of treatment.
>
> "In tertian malaria 0.06 g. (gr. 1) 'Plasmoquine' correspond in effectiveness to about 1–1.5 g. (gr. 15–22$\frac{1}{2}$) quinine.
>
> "Quartan Malaria. The schizonts and gametocytes of *plasmodium malariae* are destroyed by a daily dosage of 0.06 g. (gr. 1) pure 'Plasmoquine' (1 tablet of 'Plasmoquine' Simplex—0.02 g. or gr. $\frac{1}{3}$ 'Plasmoquine').
>
> "In uncomplicated quartan malaria there is either no further attack, whatever, of fever, or should the treatment be begun only just before the next attack is due, at most only a single attack.
>
> "By the sixth or seventh day of treatment the parasites are no longer demonstrable in the blood.
>
> "With regard to the question of the effectiveness of 'Plasmoquine' in quartan malaria as compared with that of quinine the same remarks apply as in tertian malaria.

> "Subtertian malaria. It is true that in doses of about 0.1 g. (gr. 1½) pure 'Plasmoquine' acts quite distinctly on the schizonts of *plasmodium falciparum*, but even if these comparatively high doses are continued, both parasitological and clinical relapses frequently take place. The effect of '*Plasmoquine' simplex* therefore, on the schizonts of *plasmodium falciparum* in cases of acute subtertian fever is not quite sufficient. What is new and of prime importance for practical purposes is that 'Plasmoquine' absolutely destroys the gametocytes of *plasmodium falciparum* in a few days.
>
> "As opposed to this, quinine acts well on the schizonts, but has practically no effect on the gametocytes of *plasmodium falciparum*."

We are unable to confirm these claims for plasmochin simplex, as the Medical Department of the United Fruit Company has not used the drug extensively except in combination with quinine. It is questionable whether we are justified in using such large doses of plasmochin as have been recommended by the manufacturers in view of the recent investigations made in the Almirante and Truxillo Divisions of the United Fruit Company. It may be preferable to use less plasmochin and more quinine than was first proposed.

According to Barber and Komp:

> "The work of Dr. Brosius in demonstrating that plasmochin, combined with quinine and employed in limited dosage, may be safely distributed in a population and taken without the immediate supervision of a physician, has laid the foundation for the most effective use of this new drug."

From December, 1928, to February, 1929, Barber, Komp and Newman investigated "The Effect of Small Doses of Plasmochin on the Viability of Gametocytes of Malaria as Measured by Mosquito Infection Experiments;" and in their summary of cases stated:

> "The results of these experiments seem to be clean-cut. In no case did mosquitoes become infected after plasmochin treatment. It appears that single doses as small as 0.2 mg. per kg. of body weight may affect the viability of crescents, even though they have increased in numbers, and are still living and capable of exflagellation. Quinine alone showed no measurable effect on the viability of crescents during the period of time covered by the preliminary feedings."

They further stated:

> "In routine blood work we find many cases in which large numbers of rings persist in the blood, although crescents may be lacking or very few. The relation of rings in the peripheral blood to the production of viable crescents is not very definitely known. At all events, it seems probable that a single dose of plasmochin may be effective on crescents during several days at least, whatever the fate of the rings."

and conclude that:

> "1. Plasmochin in small doses, in one case in a single dose of ½ cg., proved to have a definite effect on the viability of crescents as measured by mosquito infection tests.

> "2. Degenerative changes in crescents after the use of plasmochin did not appear to be definite enough to measure the early effects of small doses of plasmochin."

This experimental work on the effects of plasmochin was done while the patients were receiving full therapeutic doses of quinine.

In the summer of 1929, Dr. Eugene R. Whitmore in association with Drs. Roberts and Jantzen, in Puerto Castilla, pursued the work begun by Barber and his associates, and confirmed largely their results. In Almirante the patients were negroes and those of Puerto Castilla were native Hondurans. This might account for the slight difference in the results in the two Divisions. They stated that:

> "From our cases it appears that a single plasmoquin dose of about 0.325 mgm. per kilo of body weight will render the crescents in the body at that time non-infectious for mosquitoes; and that a single dose of 0.206 mgm. per kilo of body weight is not sufficient for this purpose."

This experimental work was done also while the patients were receiving full therapeutic doses of quinine.

In malarial countries all three types of malaria may be present and occasionally they are encountered simultaneously in the same individual. Very commonly the tertian and estivo-autumnal infectious prevail; and one or the other may predominate. When the benign type prevails, it may be advisable to give the larger doses of plasmochin for curative purposes.

For many years it has been known that quinine controlled the fever of malaria patients and cured many cases; but, until plasmochin was discovered, we were helpless in destroying the gametocytes and particularly those of the estivo-autumnal parasites.

It is becoming more generally believed that plasmochin and quinine play complementary rôles, and that in the treatment of all types of malaria the two drugs should be used together in order to obtain the maximum curative results. We know that human individuals, as well as the different species of anopheles mosquitoes, differ in their powers of infectiveness; and there is no way of determining the degree without elaborate experimentation. We must rely on plasmochin then to devitalize or sterilize the gametocytes, thus preventing mosquito infection; and at the same time rely upon quinine to take care of the asexual cycle. Bearing in mind the physiological action of the two drugs (plasmochin and quinine) and the possibilities of an added specific action of plasmochin on the benign forms of the malaria parasite in cases of mixed infections, a scheme for blanket treatment of a highly-infected community or labor camp should be considered when 30% or over of the inhabitants are found infected, as it is probable that two or more times that number would be revealed if blood examinations were repeated on two or more consecutive days. In carrying out a blanket treatment in a heavily-infected district, we believe that the average adult individual should receive one tablet of plasmochin compound and ten grains of quinine sulphate twice daily for a period of six days, and proportionate dosages should be given to children according to age. After an interval of two weeks, a second survey should be made; and the six-day period of treatment repeated on all of the individuals who are then found positive for parasites. It is considered that the first treatment will take care of approximately 80% of the infected cases; and that the remaining, as determined by the second survey, will be cured by the second course of treatment. It must always be considered that, in a locality where malaria is highly endemic, it is very difficult to say whether a relapse or reinfection has occurred in a given case in view of the constant possibility of reinfection.

We have found it good practice to follow up the special quinine and plasmochin treatment by administering *modified* Aiken Tonic Tablets (United Fruit Company Pink Tonic Tablets) for two or three weeks.

Naturally in every highly-infected community many mosquitoes are constantly becoming infected; and, as long as they live, these mosquitoes may continue to infect human individuals. While it has been shown that some species may live in captivity as potential infectors for as long as two or three months, it should be borne in mind that in the wild state the chances are greatly against the survival of a sufficient number over such a period to be considered important sources of infection.

Presumably there will always be some cases who will escape the blanket treatment and will develop malaria. However, their numbers will become gradually less if surveys are made at sufficiently frequent intervals and if reasonable short-radius mosquito control methods (without which permanent results cannot be obtained) are carried out in addition.

When repeated blood surveys prove that the malaria incidence has been reduced to less than 30%, efforts should be centered on the identification and treatment of all individual infected cases, and particularly the heavy gametocyte carriers. Of course, the serious pernicious cases, which will be encountered occasionally, will require more heroic medication. In general, our present knowledge does not permit us to arbitrarily dictate a dosage and method of treatment which is suitable to all cases and conditions. However, among our Medical Superintendents the opinion prevails that one tablet of plasmochin compound can be taken safely twice a day by all adults throughout the periods of treatment we have recommended and even longer.

Experimental work is being continued on a large scale in the United Fruit Company Divisions, in order to determine the optimum dosage of plasmochin compound and quinine required to give the most satisfactory results. Much has been learned and much remains unsolved. All we are able to do at the present stage is to record progress and make recommendations for the best methods known to us for handling malaria under the local conditions with which we have to contend in each of our Divisions. No scheme for the control of malaria in labor centers will prove successful without the full coöperation of those in charge of labor, as well as labor stabilization and the establishment of churches and schools where the elements of hygiene and sanitation can be taught to adults and children.

MALARIA IN THE CUBAN DIVISIONS

The progressive improvement in the malarial situation in the Cuban Divisions has continued during 1930. An intensive anti-malarial campaign began in 1926; and, since that time, great progress has been made.

In 1929 a colonization scheme was inaugurated which resulted in a great increase in the permanent local population, including women and children. A large number of these had lived previously in districts where malaria was not endemic and in consequence they had not been exposed to malaria; while many came from heavily infected endemic centers. Under such conditions we naturally expected a great increase in the number of malaria cases and were surprised to find that the anticipated increase did not materialize. The sanitary measures which had been put into effect proved adequate to afford reasonable control.

The colonization scheme assisted greatly in the stabilization of labor. Homes were established and schools provided. The pupils were taught sanitation and hygiene in addition to the subjects which pertain to a general education. In order to improve the physical condition of the laboring population, individual fruit and vegetable gardens were provided; and, in addition, sweet potatoes and beans were planted extensively, and the laborers were allowed to use them without charge. Other food products were provided at nominal costs.

When the material needs of a population are satisfied, it is not difficult to enlist their coöperation in all matters which concern sanitation and hygiene; and this is possible when labor is stabilized and educated. Even the most illiterate can be enlisted to take an interest in sanitary measures when they realize that they will thereby increase their earning power.

The camps in the Cuban Divisions are regularly inspected for the presence of sick people; who, when found, are promptly treated. Extensive surveys are conducted periodically in the various districts to determine the incidence of malaria. All infected cases are kept under observation and treated until they are free from infection. All those who require prolonged treatment to effect a cure are hospitalized. The chronic ambulatory cases are detected and receive special attention in the dispensaries.

The educational and sanitary program which has been followed in the Cuban Divisions has resulted not only in a remarkable decrease of malaria but also in lowering the morbidity rate from other ailments. The great improvement in the health of the laboring population and the increased efficiency of laborers is a matter of record. Moreover, the costs of carrying out the sanitary measures have been reduced materially.

The table below shows the results of the most recent malarial surveys in the Preston and Banes Divisions:

MALARIA SURVEY OF PRESTON AND BANES DIVISIONS

(Made between October 5th and 18th, 1930)

PRESTON DIVISION

	District #1		District #2		District #3		District #4		Total		
	No. Exam.	No. Pos.	No. Exam.	No. Pos.	No. Exam.	No. Pos.	No. Exam.	No. Pos.	No. Exam.	No. Pos.	% Pos.
Adults	34	—	162	4	125	—	125	5	446	9	2.02
School Children .	56	—	132	—	151	—	53	1	392	1	0.25
Total	90	—	294	4	276	—	178	6	838	10	1.19

Of the 10 positives, 9 were E. A. malaria and 1 was tertian; 5 were crescent carriers; 5 were heavily infected.

BANES DIVISION

	District #1		District #2		District #3		District #4		Total		
	No. Exam.	No. Pos.	No. Exam.	No. Pos.	No. Exam.	No. Pos.	No. Exam.	No. Pos.	No. Exam.	No. Pos.	% Pos.
Adults	125	3	121	2	125	—	29	—	400	5	1.25
School Children.	205	—	65	—	105	2	17	—	392	2	0.51
Total	330	3	186	2	230	2	46	—	792	7	0.88

All the positives were E. A. malaria; 2 were crescent carriers; 2 were heavily infected.

We have commented particularly on the progress of the malarial campaign in the Cuban Divisions. In each Division or locality we are confronted with differing conditions that modify somewhat the methods which must be followed in order to obtain maximum results. In the Banana Divisions, the progress made in the reduction of malaria has not equaled that of the Cuban Divisions—in some it has been disappointing and in others it has been gratifying. The results depend to some extent on the labor turnover, which is high in some Divisions.

The following Table shows the number of employees per thousand per annum admitted to our Hospitals for malaria from the years 1925 to 1930:

Year	Colombia Division	Costa Rica Division	Guatemala Division	Panama Division	Tela Railroad	Truxillo Railroad	Banes Division	Preston Division	Total Eight Divisions
1925	95.72	156.83	325.14	230.37	184.47	259.46	522.61	242.27	239.16
1926	68.69	259.75	301.05	164.94	158.42	196.46	459.48	134.51	218.60
1927	52.56	222.10	208.78	110.60	199.55	183.28	131.16	100.29	146.76
1928	64.00	147.51	134.91	120.07	113.31	162.05	53.58	37.17	99.89
1929	124.72	95.63	100.78	69.78	119.96	170.02	31.02	18.39	89.34
1930	102.51	67.02	133.68	40.15	110.44	167.03	15.73	12.30	84.76

In this Report there are separate articles on malaria by Dr. O. T. Brosius, Dr. N. P. Macphail, Dr. R. B. Nutter and Mr. J. C. McDaniel, Dr. T. de la Torre. Dr. E. I. Salisbury. Dr. V. Bustillo, and Mr. J. R. Maltsberger.

HEMOGLOBINURIC FEVER

The etiology of blackwater fever is still obscure, although there seems to be but little doubt that there is a direct relationship between malaria and blackwater fever cases. It is generally considered that in a community where there is a high rate of estivo-autumnal malaria infections, blackwater fever will be prevalent; even though there are some exceptions to this rule. As can be seen from the statistical data of the Cuban Divisions, blackwater fever cases have almost disappeared there since the incidence of malaria became low; but, on the other hand, there were comparatively few cases there in 1924 when no intensive or extensive sanitary measures were in operation. Furthermore, few cases of blackwater fever have been reported by the Colombia Division during the course of the last seven years despite the fact that the incidence of estivo-autumnal malaria is high there. The accompanying table records the number of employees treated for blackwater fever in the hospitals of our respective Divisions during the period extending from 1924 to 1930 inclusive:

	1924	1925	1926	1927	1928	1929	1930
Chiriqui	—	—	—	—	—	14	23
Colombia	2	1	2	0	0	1	2
Costa Rica	12	6	23	35	13	16	16
Guatemala	7	3	8	7	4	6	12
Panama	7	6	3	3	6	5	9
Tela	8	9	7	5	3	6	9
Truxillo	13	13	11	21	25	24	47
Banes	1	22	49	22	4	5	0
Preston	1	0	7	11	3	3	1
Total	51	60	110	104	58	80	119

There is sufficient evidence to indicate that blackwater fever develops in many cases as the result of the administration of quinine, and it apparently acts as a provocative agent for the precipitation of an attack. However, there are many cases that develop blackwater fever to whom quinine has not been given and who are cured by it if it is properly administered.

In most of our Divisions the population still includes a considerable number of malaria-infected individuals, despite the strenuous measures made to cope with the disease; and we must expect cases of black-water fever to develop until we are better able to control malaria.

AMOEBIC DYSENTERY

During the year 1909 the method of treating amoebic dysentery by huge doses of bismuth subnitrate was introduced in the Canal Zone. The patients were given a heaping teaspoonful of bismuth subnitrate (from 180 to 200 grains by weight) stirred in a small tumbler of water or preferable in aerated water, 3 or 4 times daily. The acute cases were confined to bed and placed on a milk diet. When tenesmus was present, warm saline enemata were administered. Rarely was it necessary to give a hypodermic of morphine to relieve pain. This method of treatment was continued in the Ancon Hospital up to 1913 and was considered by the hospital staff as the most satisfactory method that had been developed up to that time for the treatment of amoebic dysentery.

In 1913, Sir Leonard Rogers introduced emetine and the immediate results from its use were so satisfactory that it was added to our medical armamentarium. It was soon found, however, that a high percentage of the cases treated by emetine alone relapsed within a few months. We therefore continued the former method of bismuth treatment, and supplemented it with hypodermic injections of emetine. As a routine procedure, $\frac{1}{3}$ to $\frac{1}{2}$ of a grain was given on the first day, and after that 2 or 3 injections of from $\frac{1}{3}$ to $\frac{1}{2}$ of a grain each were administered daily until a total amount of from 5 to 7 grains were administered. This constituted a full course of the drug, which was then suspended for several days. Several modifications of this dosage followed from time to time; as it was found that emetine depressed the heart if too large doses are given or if it was continued over too long a period, and at times neuritic and other untoward symptoms developed. In order to attain the best results, careful supervision must be given to the total dosage in a single course, as well as to the possible cumulative effect of repeated courses. Up to the present time the combination method of emetine and bismuth subnitrate has been used as the routine treatment in the United Fruit Company Hospitals.

In the year 1921 yatren was introduced for the treatment of amoebic dysentery; and, more recently, the American product (Anayodin) has been placed on the market. These drugs are closely related chemically, and the reports indicate encouraging clinical results from their use. There are many things to be considered in recommending any method of treatment for amoebic dysentery. Among these are: (1) the time required to effect a cure; (2) the possibilities of relapses, the development of complications, liver abscesses, etc.; and (3) the cost of the drugs used. Dr. Ernst Thonnard-Neumann has contributed an article to this Report on the use of yatren and anayodin in the treatment of amoebic dysentery; and, although the number of cases treated and reported by him is small, the results obtained warrant further clinical investigation with the object of determining the relative merits of the different methods of treatment.

We are grateful to Dr. F. W. O'Connor for a short summary of his experiences with the treatment of amoebic dysentery by anayodin.

BACILLARY DYSENTERY

There were very few cases of bacillary dysentery treated in the Hospitals of the United Fruit Company during the past year. Two cases were reported from the Guatemala Division and 8 from the Tela Railroad Company Division—a total of 10 cases, with 2 deaths. The corresponding figures for 1929 were 30 cases and 2 deaths.

HOOKWORM

Hookworm is very prevalent among the native populations in the United Fruit Company plantations. In 1930, hookworm disease was recorded as a primary diagnosis in 557 cases. This does not indicate the true incidence of hookworm among the hospital patients, as it is often encountered as a secondary condition. It should be noted, however, that there were no deaths among employees attributable primarily to this infection, which substantiates the opinion of our clinicians that in our Divisions the condition is not a serious menace from a mortality standpoint.

LOBAR PNEUMONIA

The incidence of lobar pneumonia as well as the fatality rates continue about the same from year to year in the United Fruit Company Divisions.

The following table shows the number of cases of lobar pneumonia that were admitted to the hospitals, and the number of deaths from this condition as well as the total deaths from all causes during the years 1926 to 1930 inclusive:

Year	Cases	Deaths	Percentage	Total Deaths All Causes
1926	442	124	28.1	737
1927	329	108	32.8	765
1928	368	138	37.5	739
1929	324	95	29.3	797
1930	267	83	31.09	750

INFLUENZA

There were 533 cases of influenza and complicating conditions admitted to the hospitals in 1930, with one death. As can be noted from the statistics, influenza was mildly epidemic in the Colombia, Costa Rica and Tela Railroad Company Divisions. In 1929, 1,376 cases were admitted to the hospitals. Influenza is frequently accompanied by mild or severe bronchitis and it is not unusual for a case to develop into bronchopneumonia with a lethal termination.

TUBERCULOSIS

Undoubtedly many cases of tuberculosis develop secondarily to an attack of influenza, which must be considered as an important predisposing cause. Many cases, however, do not have this exciting aetiological factor, and others must be considered. In all tropical countries there is an abundance of fresh air and sunlight available which are inimical to the development of tuberculosis. However, the native people have a tendency to close the doors and windows to exclude the "night air" which they consider a menace to their health. Probably the most important factor in tropical countries in the causation of tuberculosis is defective nutrition which results from either the inadequate quantities or the poor quality of the foods ingested. It would be difficult to estimate the exact incidence of tuberculosis, since there are undoubtedly numerous cases with mild symptoms, which delay reporting to the hospital or dispensary until their condition is serious.

Many cases are deported and others repatriated. In 1930, there were 355 cases admitted to the hospitals and 53 died. In 1929, 380 cases were admitted to the hospitals and 59 died.

TYPHOID FEVER

During the past year there has been a large number of typhoid cases treated in our Divisions, and particularly in the Cuban Divisions. Although most of the cases occurred in widely scattered districts and the sources are almost impossible to trace; there is one district in the Banes Division where several cases developed; and this has been commented on at length in a separate article by Dr. P. S. Malaret.

In many districts where typhoid is epidemic, the existence of chronic typhoid carriers must be considered as constant sources for the further propagation of the infection. It is well known that one individual may become infected and subsequently infect others—not only directly or through the medium of flies and other insects, but also by infecting the water or milk supply. In many instances the disease occurs in a mild form; and it may not be recognized clinically, although immunity is established. Many people, when once infected, develop a tolerance to the infection; and, although they are apparently well, their secretions (bile particularly) remain highly infective for long periods. These individuals carry the infection not only from one district to another but also from one country to another. Under the conditions existing locally in the districts where our Divisions are located, we have no jurisdiction which will enable us to deal in an effective manner with such chronic carriers even though they are detected. When typhoid cases develop in epidemic form, the vaccination of those exposed offers a very satisfactory method of control until more radical sanitary measures can be made effective.

During the past year, 121 cases of typhoid fever and 11 cases of paratyphoid fever were treated in the hospitals. There were 12 deaths from typhoid and 2 from paratyphoid. In 1929, 106 cases of typhoid fever and 18 cases of paratyphoid fever were treated in the hospitals, with 18 deaths from typhoid and 2 from paratyphoid.

SMALLPOX

Smallpox was epidemic in late March and in April, in Costa Rica. It was admitted through the border of Nicaragua, and all cases were traced to their originals. There were 80 cases in the country, but no deaths recorded. Only 2 cases appeared in the districts where the United Fruit Company operates. With the active coöperation of the Government and the United Fruit Company's officials, practically all inhabitants were vaccinated.

A rather severe outbreak of smallpox occurred in Barranquilla, and made its appearance in Santa Marta. Between the months of May and September wholesale vaccinations were made in those districts of our Division which were affected, and the disease was thus prevented from assuming severe proportions. There were only 4 cases among our employees, and no fatalities.

On December 12th, a case of discrete smallpox originating in Cabo Gracias de Dios, Nicaragua, was discovered in our Truxillo Division and isolated. All known contacts were vaccinated and proper quarantine measures instituted to prevent the development of further cases. Later advices stated that an actual epidemic was prevalent in Puerto Cabezas.

The cases of smallpox reported above evidently belong to that mild type which is often called alastrim, and is generally attended with a small fatality rate. Alastrim was epidemic in Jamaica for several years, but is now reported as absent from the Island.

BERIBERI

In the year 1927, 32 cases of beriberi were treated in our hospitals; in 1928, 42; in 1929, 68; and in 1930, 34. The following table shows the number reported by the respective Divisions:

	1927	1928	1929	1930
Banes Division	1	1	4	1
Chiriqui Division	?	?	0	0
Colombia Division	5	13	15	15
Costa Rica Division	0	0	0	0
Guatemala Division	1	0	0	0
Panama Division	1	1	1	0
Preston Division	22	9	35	3
Tela Railroad Company	1	0	2	4
Truxillo Railroad Company	1	18	11	11
Totals	32	42	68	34

It is generally believed that beriberi is caused by the deficiency of one factor of vitamin B in the diet. However, Dr. Jantzen has contributed an article to this report (p. 96), in which he states that Vitamin B deficiencies in the diet will not explain all the aetiological factors in the beriberi syndrome observed in the cases treated in the Truxillo Division and that he believes there are still unknown factors in some typical cases of beriberi.

EPIDEMIC CEREBRO-SPINAL MENINGITIS

There were 3 cases of epidemic cerebro-spinal meningitis treated in our Hospitals during 1930—2 in the Tela Hospital and 1 in the Panama Hospital. Brief reports of the cases have been submitted:

Case No. 1.—A Spaniard, aged 25, employed by the Maintenance of Way Department and having his local residence in Tela, was admitted to the Hospital September 8th, 1930. He complained of fever and a stiff neck; and stated that he had been sick for two days prior to his admission. The spinal fluid contained meningococci. The patient had a fever, which persisted for two weeks. He was treated with sedatives and spinal puncture; and was discharged as cured on

October 23rd, 1930. This was the first case of epidemic cerebro-spinal meningitis seen in the Tela Hospital.

Case No. 2.—The child of an Italian merchant in Tela, aged 8 years and born in the Tela Hospital, was admitted on September 24th, 1930. She had been sick for three days, with fever, vomiting and prostration. There was no spasm on admission; but on September 25th she had a spasm of the neck muscles. The Kernig's sign was positive; and the spinal fluid was positive for meningococcus. The illness ran a very violent course, and the temperature went as high as 108°F. Meningococci persisted in the spinal fluid for 36 days, while the fever subsided in 35 days. The treatment consisted of symptomatic and supportive measures—sedatives, spinal punctures, and intra-spinal injections of anti-meningococcic serum. The patient was discharged from the Hospital on November 29th; and, although weak and nervous, and suffering frequently from severe occipital headaches, her appetite was good and her mentality, hearing and vision were normal. She had chicken-pox, at home, in December; and at that time the headaches were more frequent and severe, but she was able to walk, was gaining weight, and was apparently making a good recovery.

Case No. 3.—The patient stated that he had been vomiting and suffering from fever for 2 days before he entered the Almirante (Panama) Hospital. He was a well developed, well nourished Nicaraguan, 22 years of age. On admission his blood was positive for malaria and he was treated immediately with quinine and plasmochin. The physical examination was negative, except for a large spleen. His temperature, which was normal on the first 2 days of hospitalization, rose suddenly to 105°F. on the 3rd day, when he was receiving chenopodium treatment for a coexisting uncinariasis. The temperature was again normal on the 4th day; but on the 5th day it rose to 104°F., and remained high until his death on the 13th day after his admission. On the 5th day of hospitalization a physical examination elicited no new symptoms with the exception of pains in the right shoulder and elbow joints. On the 7th day he began to vomit; and his neck was slightly rigid, which was attributed to the pain in the right shoulder. Two days later a definite meningitic picture presented itself; and the spinal fluid was cloudy, slightly under pressure, and showed diplococcus intracellularis meningitidis. The spinal cord was washed every day with normal saline and serum injected. This was evidently a sporadic case which came from the terminus of our Costa Rica railway line, as no further cases developed during the course of the year, although this patient was admitted in June.

CORTES DEVELOPMENT COMPANY

VITAL STATISTICS AND GENERAL COMMENTS

During the course of 1930, the Medical Department assumed jurisdiction over the hospitals and dispensaries, as well as the sanitary affairs, of the Cortes Development Company in Honduras. While complete statistics are not available, a few figures and comments will give a general idea of the extent and scope of the Medical Activities in that Division:

	Employees				Non-Employees				
	White Temp.		Others		White Temp.		Others		Total
	M.	F.	M.	F.	M.	F.	M.	F.	
Average No. of Persons Dependent on Company for Treatment. .	168	6	4359	109	28	70	1435	3491	9,666
No. of Hospital Patients.	84	1	2842	28	19	14	125	530	3,643
No. of Hospital Dispensary Treatments . . .	675	73	29394	460	198	1026	3558	4416	39,800
No. of Field Dispensary Treatments	No records available								
Operations with General Anesthesia	—		57		1		35		93
Operations with Local Anesthesia	72		717		17		148		954
Died	2		70		1		16		89
Repatriated for Physical Reasons.	—		34		1		1		36

The morbidity, mortality and fatality rates were:

	Employees	Non-Employees
Average Number of Patients in Hospital Daily	53	12
Average Number of Treatments Daily in Dispensaries (excluding Field Dispensaries)	82	25
Average Number of Hospital Days per Patient	6.8	7.0
Fatality Rate per 100 Cases Treated.	2.45	2.67

Average Number of Hospital Days Annually, per Employee . . .	4.26
Hospital Admission Rate Annually per Thousand Employees . .	643
Average Number Hospital Dispensary Treatments Annually, per Employee	6.59
Average Number of Employees Non-Effective, per Thousand Employees.	11.50
Average Number of Employees Partially Non-effective, per Thousand Employees	17.77
Death Rate per Thousand Employees.	15.51
Repatriation Rate per Thousand Employees.	7.32

Two hospitals are operated in the Division. One is located at Puerto Cortes, and has a capacity of 92 beds (with an elasticity of 20 additional beds or cots); while the other, located at La Lima in the agricultural area, has a capacity of 36 beds (with an elasticity of 12 additional beds or cots). The medical staff consists of 3 doctors attached to the Cortes Hospital and 2 doctors located at La Lima.

As in the other Divisions of the Company, the principal disease from the standpoint of labor efficiency is malaria. Field surveys were conducted during the latter part of the year, with the following results:

	Number of Persons Examined	Number Showing Malaria Parasites	Percentage of Infection
Screened Camps	1,689	257	15.21%
Unscreened Camps	559	177	31.81%
Total	2,248	434	19.30%

In 1927, when 900 persons admitted to the Hospital were examined during the last 4 months of the year, the percentage of infection was:

Positive for P. falciparum	47%
Positive for P. vivax	12%
Positive for P. malariae	1%
Total	60%

An energetic anti-malaria campaign was carried on during 1930; and the satisfactory results were reflected markedly in the lowered incidence of infection found during field surveys as well as in the reduced number of patients entering the hospitals for malaria treatment.

Amoebiasis was found to be very prevalent, and stool examinations made during the months of October to December inclusive showed:

	Hospital Patients			Clinic Patients		
Month	No. of Specimens	Positive for Amoeba	Percentage of Infection	No. of Specimens	Positive for Amoeba	Percentage of Infection
September	126	32	25.32%	30	8	26.66%
October	137	42	30.79%	68	18	26.47%
November	145	82	56.55%	113	91	80.53%
December	97	68	70.10%	106	73	68.86%

There were no other features of the activities of the Medical Department which were sufficiently unusual or important to warrant special comment. It is contemplated, in future, to procure statistics and other pertinent data from the Cortes Division which will be as detailed and complete as the information submitted by other Divisions and consequently adaptable for consolidation in the Statistical Section of our Annual Report.

SECTION II

MALARIA CONTROL MEASURES

R. B. NUTTER, M.D. AND J. C. McDANIEL

Tela Railroad Company Hospital

Tela, Honduras

A practical plan for the control of malaria is the one great problem with which all concerns operating in the tropics are confronted. A number of theories have been advanced, discussed pro and con, and discarded as impracticable. However, a plan which was proposed in the early days and which has since proved to be the most practical for our present needs is that of systematically surveying all labor camps and treating all positive cases.

Although we have employed this plan on a rather minor scale from year to year, with very encouraging results; not until recently have we attempted to put it into full force. As the subject has been voluminously discussed in previous reports, a lengthy discourse at this time is deemed unnecessary, and in consequence this paper will be confined merely to facts and figures.

From February, 1930, to February, 1931, inclusive, we made 88 surveys covering the division as follows:

	No.	Estivo-Autumnal	Tertian	Quartan	Mixed	No. Positive	Total Per cent
Adults, Male	4994	369	155	41	4	569	11.39
Adults, Female	1680	112	33	15	—	160	9.5
Children	1451	95	39	4	3	141	9.7
Total	8125	576	227	60	7	870	10.7

There were 20 farms which were surveyed more than once during the specified period. The relative rates of infection at the time of the initial survey and at the time of the last survey were:

	No.	No. of People	Positive	Per cent Positive
Initial Surveys	20	1823	258	14.15
Final Surveys	20	1572	155	9.86

The following figures for the 20 farms referred to above will indicate that in most instances very satisfactory results were obtained by field work between the time of the initial survey and the date of the final survey:

Farm	Per cent Positive First Survey	Per cent Positive Last Survey
Palomas	15.0	8.5
Farm 11	22.0	10.9
Farm 12	13.6	11.3
Farm 10 (Main Camp)	10.4	15.2
Farm 10 (Screened Camp)	0.0	0.0
Farm 9	20.0	15.5
Farm 8	33.8	10.5
Farm 8 (Engineers)	35.7	8.7
La Fragua	3.45	8.1
Farm 44	8.8	3.5
Farm 13	5.9	8.3
Farm 27	2.5	9.3
Farm 25	10.9	17.0
Farm 11 (Engineers)	13.0	0.0
Zepota and Farm 12 (Engineers)	5.5	9.46
Las Flores	6.4	1.3
Palos Blancos	9.5	8.5
Farm 37	33.3	13.5
Farm 35	14.47	12.2
Farm 14	5.54	7.1

Our surveys serve the purpose of enabling us to ascertain a fairly correct index of the malarial situation in the division. In the early days, figures based on our hospital and dispensary patients indicated a lower rate of infection than actually existed in camp areas. At the present time, the rate of infection among hospital patients averages close to 25%, while the rate of infection among dispensary patients closely parallels the percentage obtained from camp surveys.

ANTI-MALARIAL MEASURES

In the fall of 1929, at the suggestion of Mr. Carleton Hale, General Sanitary Inspector, it was decided to make a malarial survey every three months of a typical farm and to treat all carriers. In February, 1930, when the initial survey was made, the farm showed 15% positive; and all were given medicine twice daily for a week. On May 19th, with the addition of a few not previously examined, the rate was 5.8%. On August 26th, fifty new laborers had been added and the rate was 8.5%. On November 28th, with sixty new laborers included, the rate was 6%.

The farm overseer was advised that the experiment was being conducted with the object of detecting and treating all malaria "carriers," and of thereby reducing the rate of hospitalization for malaria. Furthermore, he was instructed that the daily inspection of dwellings of every camp on his farm must be made rigidly and that he must see that all sick persons received prompt attention at the District Dispensary.

A chart is carried in our Office showing the source of all hospital malaria cases, for the month and the period. The farm referred to above ceased to function as a source of cases of malaria requiring hospital treatment; and the reduction of the rate from 15% on the first survey to 5.8% on the second survey, led us to extend the work. The chart was used as a guide to the camps with heaviest infection.

Then it was discovered that the number of cases of malaria coming to the Hospital from a specific camp was not an accurate guide to the "carrier" rate; as some camps with a low percentage of "carriers" were sending more cases of malaria to the Hospital than were other camps which showed a very high rate of infection but where daily inspections were made and the sick sent immediately to the Dispensary.

We are assured of coöperation by the Heads of Departments; and the entire Division has been surveyed once, and many camps from two to five times, with results that are so convincing that it is our intention to survey the entire Division at intervals of three months during 1931.

The methods in effect in the Tela Division, at present, are as follows:

Daily inspection of each camp is made by a responsible person, and the sick are referred to a Dispenser. Quinine is given to any fever case that may not be able to get to the Dispensary until the following day.

All patients sent to the Hospital must come through the Dispenser, except in emergencies.

A list of the sick is sent daily by each camp to the District Farm Office; and the District Office sends to the Hospital a semi-weekly report giving the names of the sick and a brief statement of the treatment administered or action taken in each case. On arrival at the Hospital of a moribund or neglected case we can ascertain, by checking the report, whether camp treatment has been neglected or the patient has been improperly treated by the Dispenser.

The line Technician notifies the central office of a Department when a survey of a certain group of camps will be made, and requests that they be notified and have the men available. Each camp is advised as to the time the Technician will arrive. From three to six camps are surveyed, and from 300 to 600 blood specimens are collected, at a trip. After examinations are completed a list of the positives is sent to each camp with medicines sufficient for six days treatment of each infected individual. One plasmochin compound tablet and ten grains of quinine, twice a day, is administered personally by the overseer, foreman or other responsible person; and, after the period has expired, a report is sent to the Hospital signifying that to his personal knowledge all have received the full course of treatment or stating the reasons why any have failed to receive the prescribed medicine. If a report is sent that all have been treated, and two or three of them are in the Hospital at the same time, it is obvious that the work was not done.

A copy of our monthly chart, showing the sources of hospitalized cases of malaria, is sent to Heads of Departments and the Sanitary Inspector; and the results of our surveys are circulated, to keep them informed of the progress made.

The salary of the line Technician and his incidental expenses, and the cost of the medicine, are the only expenditures incurred by our Department for this work.

The success of this method depends on the coöperation of other Departments and to them is due most of the credit for what is accomplished.

Our Superintendent of Agriculture was absent for six months of last year and, on his return, immediately observed improvement in the condition of the laborers and that it was no longer necessary to carry a 25% surplus of laborers in order to get the necessary work done.

The Division Sanitary Gang has been discharged; with the exception of the Inspector, who recommends necessary sanitary and mosquito-control work which is carried out by the various Departments with members of their own personnel who are trained by the Division Sanitary Inspector.

The Paris green dust is mixed in the Machine Shop and distributed as requisitioned by the Sanitary Inspector.

Conclusions

Our conclusions from experience in this Division are:

(a) that attempts at mosquito control and intensive sanitary work alone will not reduce malaria, to an extent which will justify the expenditures involved to effectually control mosquito breeding, in the large areas of a banana division where the labor turnover is large and the laborers are housed in unscreened quarters.

(b) that camp treatment is of little or no value; if the laborers are merely given the medicines and instructed to treat themselves, as they will not take them regularly for the required length of time; and

(c) that, with the methods now employed and with reasonable stabilization of labor and coöperation from other Departments, it is possible to reduce the rate of infection to 5% as determined by periodical surveys.

INTERPRETATION OF A THREE-YEAR MALARIA CURVE IN CHIRIQUI

J. R. Maltsberger, B.A.,

Laboratory Technician and Sanitary Inspector of the

Chiriqui Land Company

The course of two measures attempting malaria control on the population of a pioneer banana plantation in Chiriqui has been observed from the beginning of its construction period early in 1928 up until the present time. A graphic indication of progress is observed in the accompanying curve, representing the results of six complete divisional blood surveys on personnel of the company's five largest camps. This curve has its origin and partial explanation in the basic factors of topography, climate, and the social history of this region.

TOPOGRAPHY AND CLIMATE

From the standpoint of malaria control, the Chiriqui Land Company occupies a unique position among the ten or more major production units of the United Fruit Company. It is a new and rapidly developed division on the Pacific coast of southwestern Panama, and, while partly bordering on Costa Rica, it yet lies in about the same latitude as Central Venezuela, Abyssinia, Ceylon, lower Siam and upper Borneo.

Topographically, this division lies compactly in approximately a fifteen mile breadth of coastal plain sloping up to the foothills of the extinct volcano Chiriqui. Five continually flowing rivers run roughly parallel courses, at a distance of two to five miles apart, from these foothills through the division and into a crescent-shaped bay of the Pacific ocean. In the beach area a number of brackish lagoons are formed by tidal action. Large swampy areas inland have, during the past three years, been drained by an efficient system of canals. Extensive forests, mainly of deciduous trees, characteristically tropical vines and underbrush, have given way to banana plantations. A railway system, including main line, belt lines and numerous spurs, skeletons the division with cleared right-of-ways.

With its warm climate at all times of the year, the temperature in this littoral shows no great fluctuations. During the past three years the lowest average monthly mean temperature has been 76° and the highest average 85.5° Fahrenheit. The transition from the dry to the rainy season is rather abrupt; so that twice a year the seasonal phenomena are sharply contrasted. The dry months begin with November or December and continue into March or April; when daily rains commence, and reach their maximum precipitation usually in October or November · This datum* is graphed in detail in Chart 1.

Humidity is relatively high; and nightly fogs and dew, even during the dry season, are sufficiently heavy to maintain an early morning atmospheric humidity near the saturation point. Throughout the seven or eight months of the rainy season humidity is unqualifiedly high.

SOCIAL AND ECONOMIC BACKGROUND

The pertinent social history of Chiriqui has its origin in the indigenous population of Spanish and Indian stocks, with the resulting Spanish-Indian mixtures. These native Chiricanos lived on small, poorly developed agricultural clearings. Malaria, with them, was chronic-endemic.

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* This is an example of how statistical data may sometimes be misleading when applied to actual practical conditions. As a matter of fact, the "dry" season, so far as our sanitary work is concerned, begins considerably later than the date of the cessation of rains—i.e., temporary bodies of standing water do not evaporate at once. Furthermore, our actual "rainy" season, from the standpoint of sanitation, begins weeks later than the meteorological data indicates as the parched ground readily absorbs all of the first rainfall.

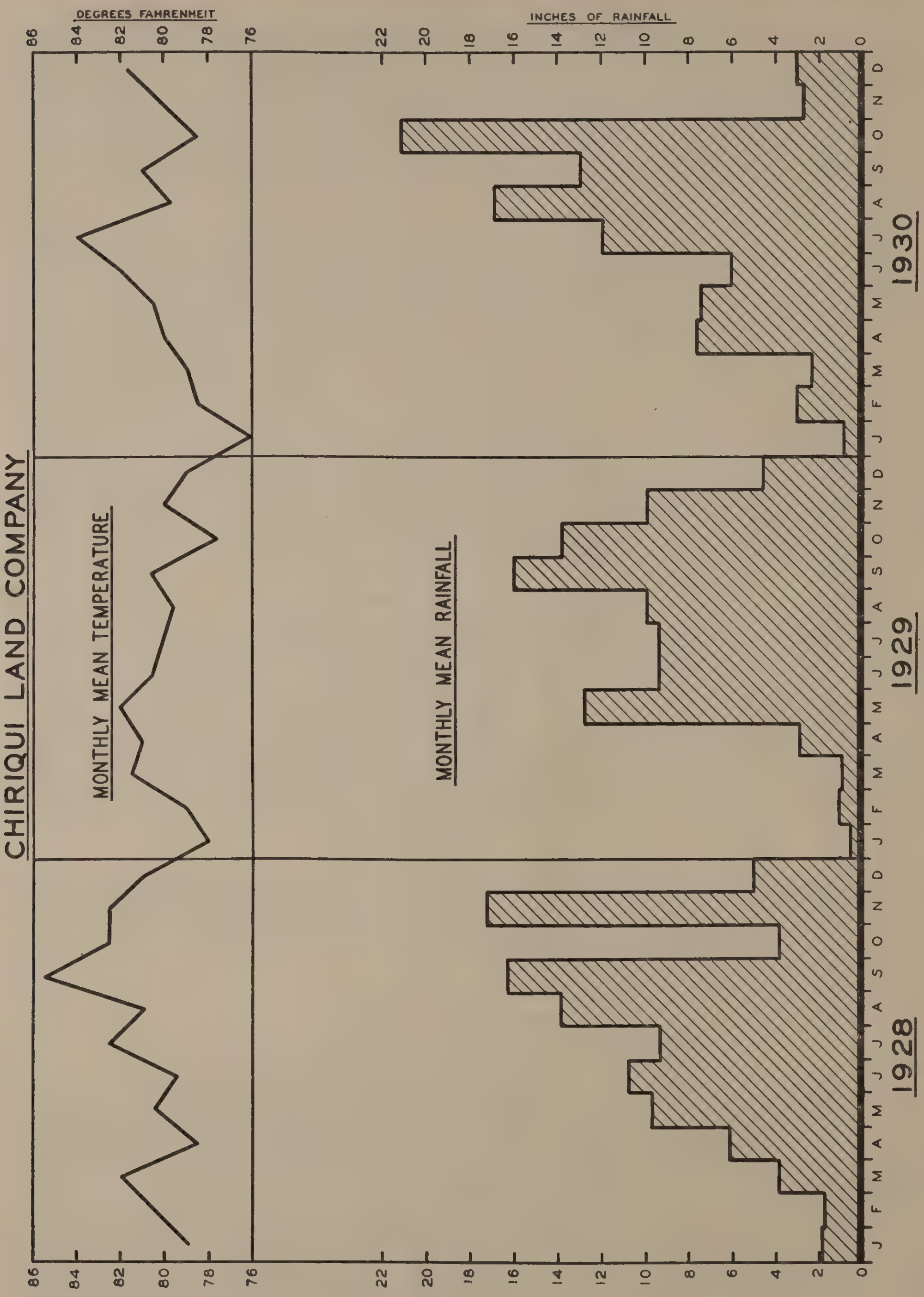
CHIRIQUI LAND COMPANY
MONTHLY MEAN TEMPERATURE
MONTHLY MEAN RAINFALL
DEGREES FAHRENHEIT
86
84
82
80
78
76
INCHES OF RAINFALL
22
20
18
16
14
12
10
8
6
4
2
0
J F M A M J J A S O N D
1928
1929
1930

Chart 1

A construction company preceded the arrival of the fruit company personnel. This company built railroads, bridges and a dock; and diluted the native population by recruiting labor from both temperate zones, Central America and the West Indies.

The development period of the Chiriqui Land Company was well begun in 1928. The possibilities of malaria control did not look promising. No organized sanitary or anti-malarial measures had been undertaken by the construction company; and the malaria incidence had reached acute-epidemic proportions.

In the Port Headquarters, three distinct social groups lived side by side. At first the Latins congregated themselves together in the *manacca* (palm-thatched) shelters of "Rabo de Puerco;" West Indian negroes were grouped in the shingle huts of "Silver City;" and the temperate zone employees lived between, in an odd assortment of buildings.

A blood survey made at the port at this time showed an infection rate of 56.8%,[1] in a population mainly adult. During this time and shortly afterwards, practically every individual in the division contracted malaria. Consequently, recommendations were made to abandon the Port site as too unhealthy and difficult to sanitate. The up-country natives referred to Puerto Armuelles as "Puerto de la Muerte" (Port of Death).

Due possibly to less congestion, conditions at other points of operation were not so bad as those in Puerto Armuelles. Blood surveys here, however, showed a high rate of infection; with many heavy aestivo-autumnal infections. Open manacca and reed shelters lined the right-of-ways; and an early rainy season was an added complication. Transportation and other difficulties made it hard to get fresh fruits and vegetables to the labor camps in sufficient quantities to prevent nutritional disturbances; and, finally, police control was unsatisfactory, if not altogether lacking.

FIRST CONTROL PLAN

Treatment of Carriers Apprehended by Blood Surveys

These social and economic conditions were characteristic of the early months of 1928. In July and August, a sanitary crew and a blood survey group were organized. The sanitary crew attempted short range control of anopheline breeding by the application of Paris green on potential water areas. However, due to the lack of facilities for hospitalizing the large number of acutely ill people, the most emphasis and energy was centered in the blood survey and treatment campaigns. Each district was surveyed, and those found to be infected were treated with quinine and plasmochin compound.

A gratifying downward curve in the incidence of malaria resulted from this first effort. We began to hope to realize eventually at least the "minimum effective degree of perfection" by our "carrier" treatments.

Each succeeding survey brought out some point of interest or real value. Our technique improved by these observations until, for our needs, it produced a high degree of efficiency. We lengthened the period of supervised treatment and concentrated attention on the infected children. We found a suspension of powdered quinine sulphate in aromatic syrup of Yerba Santa to be a satisfactory alternative to the difficult procedure of forcing a solution of sulphuric acid and quinine into infected babies. Furthermore, we considered the social nature of the disease with which we were working, and held it as reasonable and just to take active measures against the few categorical or actual objectors to treatment. In the case of refusal on the part of an infected Company employee, we were privileged to have his pay withheld until a complete antimalarial treatment had been taken; and, in the case of a non-employee, we coöperated with the Corregidor (local magistrate) who would impose a fine or lecture the offender. Finally, inspired by the publication of the conclusions of Barber and Komp[2] that plasmochin in solitary small doses had the property of sterilizing gametocytes, we began to give plasmochin to all individuals reporting for blood tests in the routine blood surveys. Thus we hoped to sterilize the gametocytes in all "carriers" for a relatively long period.

During the second quarter of 1930 an increase occurred in the vector prevalence with a subsequent increase later on in July in malaria admissions at the hospital. From a monthly average of 12 admissions per thousand employees during the preceding eighteen months, the admission rate rose to 24.2 per thousand. Agreeing, on sufficient evidence, that the sanitary direction was lacking in energy and comprehension of the problem, a new larval-control unit was organized. The "carrier" treatment campaigns were temporarily abandoned, and we entered into a new and independent phase of malaria control.

SECOND CONTROL PLAN

Anti-larval Measures

An effort was made, at the beginning of this new phase, to assemble and give proper emphasis to the local epidemiological variables. The area to be controlled represented approximately one hundred thousand acres; with population centered in five camps or towns of 400 to 1200 inhabitants, and six smaller camps with 25 to 200 population. All the personnel of this Company were found grouped rather compactly in these centers, with each town at a sufficient distance (2 to 5 miles) from the others to be practically secure against traded infections by a migratory vector. We were fortunate to begin our observations at the end of the dry season. Charting of breeding foci within a radius of a mile or more of each town was our first achievement. Larval destruction was just established in these proven breeding areas; when an abrupt rainy season was upon us, radically altering the conditions in every area under treatment. The following table shows the seasonal variability in breeding foci:

Puerto Armuelles	Dry Season	Rainy Season
Executive and Exportation Area.	6 algae coated creeks or rivers, with tributaries. 2 lagoons. 2 Electrical Department spray basins. 2 springs.	4 lagoons. 2 shallow creeks. Casual depressions; seepages; and discarded receptacles.
Line Towns		
Plantations—productive area.	8 algae edged rivers or creeks and tributaries. 4 canals—algae. 8 minor drainage systems—algae.	Right of way borrow pits; abandoned roads; animal hoof prints; pasture seepages; casual depressions.

No complete classification has yet been made on the anopheline fauna in this area. Up to the present, females of the following species have been identified: A. pseudopunctipennis; A. albimanus; A. cruzii, and A. bathanus. Larvae have been collected which agree with the description of A. tarsimaculatus and A. vestitipennis.

ANTI-LARVAL PROCEDURES

We began, and are continuing, our anti-larval campaign with the aid of four native laborers, and the use of a railway motor car two days a week. By working side by side with the men, a manifold increase is noted both in the morale of the men, and in the quality and amount of labor accomplished by them. The working pace can thus be adjusted at will, and an intimate and valuable contact established with the problem at hand as well as the human factors effective in its execution. We have, therefore, except in the larger drainage measures, done our own work of local drainage and filling when practical; oiling areas suitable to this form of treatment; clearing the basins of dry lagoons and ponds to facilitate and simplify treatment during the rainy season, and removing rocks and boulders blocking the flow of streams, thus to expedite the drying up process. The greatest proportion of the time is consumed in the manufacture and application of Paris green mixture. As a base we use 1 part sifted road dust with 2 parts dry sawdust; and Paris green is then added in the proportion of 1 part of Paris green to 100 parts of the dust mixture, and rotated for 10 minutes in a specially constructed barrel.

Breeding areas are treated on the same day every week. We are satisfied only with long range control. The long flight of a number of anophelines under variable conditions as quoted by Swellengrebel[3] in 1929, prove the imminent danger of relying entirely on short range sanitation. Sluggish dry weather streams, and drains showing heavy breeding are treated to their sources when practical. One shallow algae edged river near the Port is dusted for a distance of 2½ to 3 miles. The present control measures aim at the destruction of all species of anophelines breeding in this area. Hackett[4] warns against unqualified acceptance of generalizations from the local experience of others. Here we feel sure that A. albimanus is our principal vector; yet we have no proof that pseudopunctipennis, bathanus, or even cruzii are not of some importance as vectors of malaria under the variables present in Chiriqui.

SUMMARY AND CONCLUSIONS

This plan of control has been in operation a scant eight months, and we believe that here the important coefficient of time has not been allowed its necessary period for action. It is only with misgivings that we compare the value of the two control plans applied in Chiriqui. Besides, we are confronted with the classic difficulty of determining the direct value of either measure. The curve of infection is going down. The current blood survey of the Port area, on workers similar to the group who showed an infection rate of 56.8% in early 1928, now shows a rate of 4.8% with no heavy infections noted. The incidence and severity of malaria is decreasing; and a previously marked dominance of aestivo-autumnal forms, is giving way to a slight preponderance of the benign tertian type. Chart 2 shows the progressive relationship between the two types. Quartan malaria has consistently been of rare incidence. Social and economic conditions have become progressively better; although the protective features of screening, quinine prophylaxis, and house destruction of adult anophelines, have not been applied as measures aiming at protection of the laboring population. Caribbean negroes have existed side by side and under similar living conditions with the less resistant natives and other Latin labor.

Surveys.	1928	1928	1929	1929	1930
Progreso	78	81	70	51	31
Corredor	94	90	88	47	52
Port	85	94	82	60	42
Blanco	58	96	78	43	53
Esperanza	91	93	84	43	54
Average	81	90	80	48	46

CHART 2. CHART SHOWING PERCENTAGE OF E. A. MALARIA IN TOTAL NUMBER OF BLOODS FOUND POSITIVE IN THE FIVE SURVEYS

The phenomenon of the infrequency and insignificance of splenic enlargement in Caribbean negroes (as pointed out by Clark[5]), and their marked resistance to

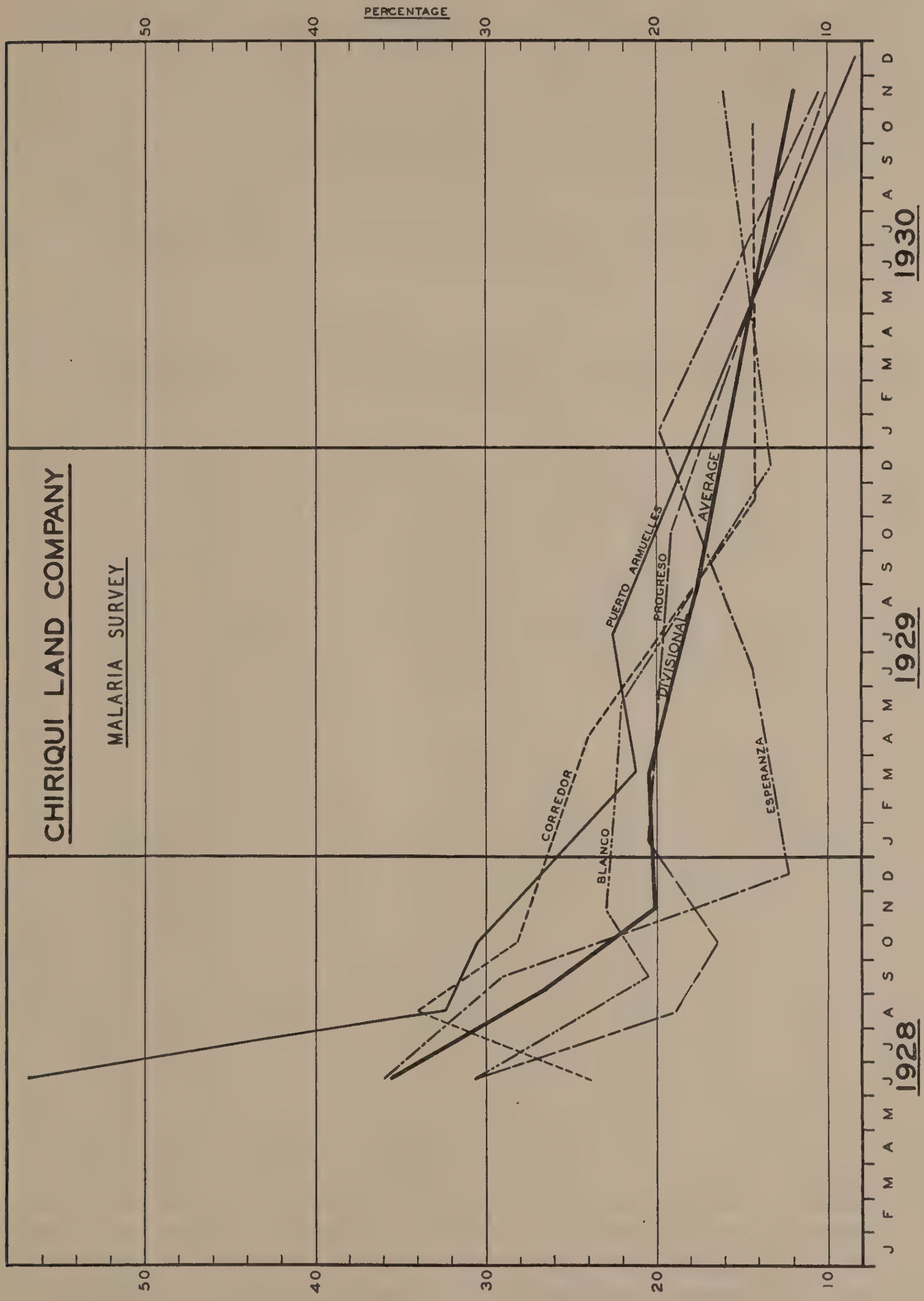
CHIRIQUI LAND COMPANY
MALARIA SURVEY
PERCENTAGE
50
40
30
20
10
J F M A M J J A S O N D
1928
1929
1930
CORREDOR
BLANCO
PUERTO ARMUELLES
PROGRESO
DIVISIONAL
AVERAGE
ESPERANZA

CHART 3

haemoglobinuria, add more sources for error in the statistical epidemiological data for this area. An interesting fact is brought to light by our series of blood surveys. During the past three years 11,762 examinations were made on Company personnel. Of this number 4,030 were of the negro race, and 7,732 of predominating Latin origin. There were 769 or 19% of the negroes, and 1,473 or also 19% of the Latins, who showed positive blood films. Clinical and morbidity data, however, do not bear out this relationship. Palpable spleens, which markedly characterize the malarious Latins, are not of diagnostic importance in Caribbean negroes; and, of the 43 hospitalized cases of blackwater fever in this division, all have been of the Latin race.

Of the seventy or eighty women and children from the temperate zone who arrived here subsequent to the period of acute epidemic malaria, none has contracted this infection.

The cost of malaria sanitation for an area of these dimensions we hold as negligible, if the maximum standard of efficiency is being approached. Our expenses here include the salary of the local sanitary inspector, a foreman-workman at $60.00 a month, three laborers at 20 cents an hour, the rental on a railway motor car two days a week, Paris green at market prices, and the use of a truck or tractor for the occasional movement of oil or large batches of Paris green mixture. Oil is seldom a cost item. We are able to salvage wastes from various sources in the Mechanical Department and in the areas where steam shovels and tractors are operated.

Finally we have summarized our approach to malaria control. We have made no attempt to employ all means of control. The terrain here does not lend itself to Kligler's[6] happily applied alternative of impounding and releasing of anopheline breeding waters. We believe that malaria in Chiriqui is again entering the stage of mild chronic endemicity characteristic of this sparsely populated region before the invasion by the temperate zone industrial pioneers. Functions have augmented and factors multiplied—so that further progress undoubtedly lies in anti-larval control administered with energy and foresight; for in Chiriqui we have not, in our most optimistic moments, maintained a hope for the spontaneous regression of malaria.

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PLASMOCHIN AS AN AID IN MALARIA PREVENTION IN GUATEMALA

N. P. Macphail, M.D.

United Fruit Company Hospital

Quirigua, Guatemala

During the twenty-two years in which the Medical Department of the United Fruit Company has made earnest efforts to reduce the incidence of malaria in the Motagua Valley where they operate, dependence was placed in the earlier years on two main measures.

On the one hand, all collections of water in close proximity to camps were drained when possible; and treated with oil or Paris green when drainage was impracticable. These measures were directed against the breeding of the Anopheles mosquito. On the other hand, the human carrier was treated with lengthy courses of quinine, arsenic, and other tonic preparations, under as close supervision as possible.

By experience, we found that these measures reduced the incidence of malaria very much; a smaller number of employees developed serious forms of malaria, requiring Hospital treatment; and the death rate was much reduced.

In the more recent years, about 1925 and 1926, when the thick-film method of blood examinations was perfected and in general use, we began extensive blood surveys of the camp labourers and their dependents. A surprising number of those bloods were found to contain gametocytes, and frequently when no trophozoites (ring forms) could be demonstrated.

We then began to examine the bloods of patients about to be discharged from the Hospital, in a convalescent state, after malaria attacks. We found that an alarming number of those patients; whose symptoms of fever had disappeared for a minimum of five days, and who had excellent appetites and were demanding to be discharged; carried large quantities of gametocytes in their peripheral blood.

This presented a difficult problem, as we found it impossible to eliminate the sexual forms from the blood by quinine and arsenic treatment in a reasonable time. In consequence we were discharging from the Hospital large numbers of convalescent patients who went back to their camps in an excellent state to infect mosquitoes, to join the ranks of many similarly infested persons who were already there.

About this time we had the first opportunity to test the value of plasmochin in the treatment of malaria. A large series of hospital cases of malaria were placed on plasmochin treatment, and daily blood specimens were taken and examined. The dosage recommended by the manufacturers and sponsors of plasmochin was 9 to 12 centigrams daily for six days; and we began with that dose. All cases chosen had positive bloods on admission; and one series was given plasmochin alone, while another series was given plasmochin and quinine together.

The most interesting and important development was that in all the cases, in a series of over 100, gametocytes had entirely disappeared from the peripheral blood in five days; and in the majority of cases on or before the fourth day. Another notable finding was that, in cases of estivo-autumnal infection, the ring forms did not disappear as quickly in those treated with plasmochin alone as in those patients treated with a combination of plasmochin and quinine.

I will not detail all the experimental work carried out; but when we had checked carefully more than 1000 cases, we reached the following conclusions:

(1) Plasmochin had a much more powerful effect in destroying the gametocytes of all forms of malaria than any treatment which we had known previously.

(2) Quinine was much more effective than plasmochin in the destruction of ring forms (trophozoites) of estivo-autumnal malaria.

(3) The ideal treatment in all types of malarial infections was a combination of plasmochin and quinine. With this treatment, symptoms were rapidly controlled; the formation of gametocytes was effectively prevented; and already existing trophozoites and gametocytes were rapidly destroyed.

The results demonstrated that at last we were able to discharge convalescent malaria cases from the Hospital with their peripheral blood free from the sexual forms of parasites. We felt that we had arrived at another "mile-post" of progress, and that all Hospital cases were non-infectious to mosquitoes when they returned to their camps.

During the above experiments we found that a small percentage of the cases developed signs of toxicity, before completion of the prescribed course. The main symptoms were pain in the abdomen, cyanosis of lips and nails, and occasional nausea. Less than 5% of the patients developed this condition, and all recovered promptly when treatment was suspended. The dosage for adults had been 2 grams of quinine and 9 centigrams of plasmochin daily for five days. On account of the toxic symptoms which developed occasionally we felt that plasmochin, while a valuable aid in hospital treatment, could not be utilized as an aid in field-work, in the dosage recommended.

We then undertook a series of treatments with 6 centigrams of plasmochin instead of 9, and checked results with daily blood slides.

It was very gratifying to find that the smaller dose was as efficacious as the larger. In a large series of cases it was noted that toxic symptoms were practically absent; and we felt justified in believing that we could safely utilize plasmochin, in these reduced doses, in our field work.

Later still (1928) we experimented along similar lines with a dosage of 3 centigrams daily for six days, combined with two grams of quinine; and careful blood control examination showed that gametocytes disappeared in 4 to 5 days at most. With this dosage toxic symptoms were unknown; and it was decided that plasmochin could be added safely to the stock of medicines entrusted to field dispensers and overseers, for administration in this dosage to mild cases of malaria who did not wish to come to the Hospital.

At intervals blood surveys are made of all the inmates of our camps, and a list of the positive ones submitted to the overseers. All adults on the list receive 2 grams of quinine and 3 centigrams of plasmochin daily, in 2 doses, for six full days; and children's dosage is modified according to age, and noted on the list. In earlier surveys we checked up all the bloods of those treated, the day after treatment was completed. Results were so uniform, and negative bloods so constant, that we have practically discontinued a second examination and so save the doctors' and technician's time. The re-surveys left no doubt at all that the treatment had cleared the peripheral blood of parasites—rings and gametocytes—and that for the time being all individuals treated were unable to infect mosquitoes.

When blood surveys were made in camps before we had plasmochin, and treatment with quinine and arsenic given to positives, we found in the re-survey that in most cases ring forms had disappeared but that frequently there were more sexual forms present in the peripheral blood than before treatment. As long as sporulation continues in a malaria attack, gametocytes will almost certainly develop; and quinine is unable to prevent this formation, as plasmochin does.

With plasmochin at our disposal we have an excellent aid in the prevention of mosquito infection, and a safe and valuable help in anti-malaria work in the camps.

We have learned from experience that malaria cannot be eradicated from large tracts of tropical low-lying lands, such as those occupied by the plantations of the United Fruit Company, with anti-mosquito measures alone. The treatment of the human carrier is a most important measure in any campaign for the reduction, and ultimate eradication, of malaria in a large and scattered community.

I have outlined above one of the methods which we have found most useful in attacking the infections carried by the human being; viz., periodic surveys, with rigidly supervised treatment of those with positive bloods. I might add that our practice has been to treat *all inmates* of any camp in which more than 30% of the inhabitants were found to be positive. This measure has been extremely useful, and has had no opposition from the labourers or their dependents, who now understand that we are trying to help them. It is over two years since we have had to adopt this measure, as no community has shown 30% infection in that period.

Another camp measure which I believe to be a most valuable aid to the reduction of mosquito infection is the rigid daily inspection of each room in each camp in the Division by an intelligent administrator or practicante. When a man, woman or child feels indisposed, he or she is seen in less than 24 hours after the onset of the illness. Repeated medical surveys of employees in the Motagua Valley make it certain that 85 to 90% of all those feeling ill owe their indisposition to malaria infection.

Appropriate early treatment with a cathartic, and quinine and plasmochin, not only prevents the individual from becoming worse and probably developing a serious case of malaria, with consequent loss of time; but it also prevents him from becoming a reservoir of infection to the mosquito.

Some skilled observers have more recently undertaken a study to determine the minimum dose of plasmochin which will prevent mosquito infection from human beings with heavy infestations of gametocytes in their peripheral blood.

Dr. Barber and Mr. Komp who studied malaria conditions in the Motagua Valley some years ago, and Col. Whitmore, working in different sections of the Tropics reached identical conclusions, which are of extreme interest to those of us engaged in preventive work. They determined that a dose of 2 centigrams of plasmochin so devitalized the gametocytes in a heavily infected human being that the mosquitoes which were liberally fed on his blood were unable to develop oocysts.

When such highly experienced and careful observers are willing to make such a statement I feel doubly sure that we have in Plasmochin an ally of vital importance in our fight to reduce, and finally eliminate, malaria from the low-lying portions of Guatemala.

CONCLUSIONS

Up to the present we have used in our work in Quirigua 1,388,000 tablets of plasmochin and feel justified in coming to the following conclusions concerning the use of Plasmochin in Malaria.

(1) *Plasmochin effectively destroys the gametocytes of all forms of malaria when given in doses of 3 to 4 centigrams daily for one week.*

(2) *Combined with quinine, plasmochin is a safe and sure way of preventing formation of gametocytes during an acute attack of malaria; and the combination destroys all types of parasites.*

(3) *Toxic symptoms need not be feared when the dosage is limited to 3 centigrams daily for a week or more.*

(4) *We have ample clinical proof to justify advancing the hypothesis that plasmochin is of importance as a curative factor in chronic cases which have resisted extended efforts at eradication with quinine and arsenical preparations.*

(5) *In the hands of a competent sanitarian, plasmochin is a valuable aid in reducing the incidence of mosquito infection, through the undoubted properties which it possesses of causing the devitalization and destruction of malaria gametocytes.*

THE MALARIA INDEX IN THE COSTA RICAN DIVISION AS AFFECTED BY CONTROL MEASURES

Edw. I. Salisbury, M.D.

Compañia Bananera de Costa Rica Hospital

Port Limon, Costa Rica

In a former paper* the control of malaria in Costa Rica was fully discussed. This report will merely record, by graph and statistics, the malaria index from year to year as we have progressed in the control of the disease.

Realizing that the hospital admission rate for malaria did not give the true incidence of malaria among our employees, Dr. Herbert C. Clark began a series of field surveys in 1926. Thick films were made from specimens of blood taken from employees and their families in the camps, farms and villages of the Division. The initial surveys were made in scattered areas with the idea of obtaining, as near as possible, a cross-section of the population. Numerically, the extent of the survey was rather limited; and only six or seven hundred blood specimens were examined. Later, the surveys were so extended as to represent nearly every farm, camp and town, and to include all the inhabitants living in the area affected by our control work regardless of whether they were employees or not. As many as five or six thousand blood specimens have been taken, in order that a cross-section of the population thus obtained might more closely approximate the real malaria incidence.

More recently we have confined these surveys to two seasons—i.e., one is taken in March (the end of the dry season) and the other in August (the mid-rainy season). Furthermore, we have separated employees and non-employees, so as to make more accurate comparisons.

Anti-mosquito measures are continued throughout the year; and the Dispensers in charge of our stationary and traveling dispensaries are continually on the alert to detect and treat individuals infected with malaria, although they concentrate on the treatment of all positive cases after each survey.

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* "Control of Malaria in Costa Rica," Edw. I. Salisbury and J. A. Corrigan, United Fruit Company Annual Report, 1929.

The data given in the following tables, and the accompanying comments, will convey a fair idea of the practical results which have been gained by our intensive anti-malaria campaign.

TABLE I

SUMMARY

		Malaria Field Survey Rates				No. of Employees Hospitalized for Malaria	
Year	Season	Blood Specimens Examined	Positive for Malaria	Percentage Positive	Examiner	Cases	Rate per 1,000 Emp.
1926	Fall	606	179	29.5	Dr. Clark	1761	269
1927	Fall	679	258	38.0	Dr. Clark	1483	230
1928	Fall	752	143	19.0	Dr. Clark	1087	170
1929	Spring	925	192	20.8	Juan Coto	698	111
1929	Fall	1879	231	12.3	Juan Coto		
1930	Spring	5622	612	10.9	Juan Coto	402	77
1930	Fall	3588	503	14.0	Juan Coto		

Comments.—It will be observed that there has been a considerable decrease in the percentage of infected individuals discovered during field surveys, as well as a remarkable reduction in the number of employees requiring hospital treatment for malaria. This indicates that there was an *actual* reduction in the malaria rate during recent years; and that we have not, during the last two or three years, been merely treating cases in the camps and dispensaries instead of hospitalizing them as in the preceding years, as might be inferred if our conclusions were based solely on the hospital admission rates.

TABLE II

MALARIA SURVEYS BY DISTRICTS

Year	Season	Total		Estrella		Limon		Zent		Siquirres		Turrialba	
		Emp.	All	Emp.	All	Emp.	All	Emp.	All	Emp.	All	Emp.	All
1926	Fall	—	29.5	—	32.7	—	34.0	—	26.0	—	37.2	—	2.3
1927	Fall	—	38.0	—	32.1	—	—	—	45.4	—	33.8	—	—
1928	Fall	—	19.0	—	25.5	—	—	—	21.2	—	18.9	—	10.0
1929	Spring	—	20.8	—	21.3	—	—	—	20.2	—	—	—	—
1929	Fall	—	12.3	—	11.4	—	—	—	16.4	—	15.2	—	2.1
1930	Spring	8.6	10.9	8.4	12.5	8.8	11.7	7.7	10.3	10.6	12.5	5.7	5.9
1930	Fall	10.9	14.0	12.9	20.0	8.0	14.5	9.7	10.6	11.2	6.5	21.7	23.0

Comments.—In the columns headed "Emp." we have shown the rates for employees only, while in the columns headed "All" we have given the rates for the general population *including* employees. During 1930, the percentages of infection among employees and non-employees respectively have been tabulated separately. The relatively low rate among employees, as compared with the prevailing malaria rate, is the result of the more effective control which we can exercise over the living conditions and medical treatment of the former.

TABLE III

RELATIVE PERCENTAGE OF INFECTION AMONG CHILDREN AND ADULTS AS REVEALED BY FIELD SURVEYS

Year	Season	Children	Adults	Total
1926	Fall	38.6	25.4	29.5
1927	Fall	47.5	35.9	38.0
1928	Fall	22.1	18.2	19.0
1929	Spring	23.7	20.2	20.8
1929	Fall	12.8	12.1	12.3
1930	Spring	18.2	8.6	10.9
1930	Fall	22.5	11.5	14.0

Comments.—For the purpose of comparison, all individuals 12 years of age or less have been considered as "children." The greater prevalence of malaria among children is shown clearly. It is our experience that this is true of all "stay-at-homes"—unemployed women, children and aged persons. The "house-catch" of anophelines is always greater in the homes harboring children and elderly people than in the houses where bachelors reside.

TABLE IV

RELATIVE PERCENTAGE OF INFECTION AMONG INDIVIDUALS OF THE TWO PRINCIPAL RACES—LATINS AND WEST INDIAN NEGROES

Year	Season	Latins	West Indian Negroes	Total
1926	Fall	—	—	29.5
1927	Fall	41.0	34.2	38.0
1928	Fall	18.9	19.1	19.0
1929	Spring	19.2	21.6	20.8
1929	Fall	11.1	14.4	12.3
1930	Spring	9.8	11.1	10.9
1930	Fall	13.5	14.2	14.0

There is practically no difference, in this Division, in the incidence of malaria among the Latin and the negro races; although the negro race is more resistant to the debilitating effects of the disease.

TABLE V

PERCENTAGE OF VARIOUS TYPES OF MALARIA PARASITES FOUND AMONG POSITIVES

Year	Season	Estivo-Autumnal	Tertian	Quartan	Mixed
1926	Fall	74.5	20.1	1.1	4.4
1927	Fall	74.4	18.6	5.4	1.5
1928	Fall	55.2	37.7	4.9	2.1
1929	Spring	86.4	12.5	1.05	0.05
1929	Fall	81.8	16.0	2.0	—
1930	Spring	93.6	6.0	0.3	—
1930	Fall	99.0	0.4	0.2	—

The use of Plasmochin Compound tablets, in conjunction with quinine, was begun in this Division in 1928. Since that time, there has been a steady decrease in tertian and quartan malaria until these two forms have practically disappeared.

TABLE VI

PERCENTAGE OF CARRIERS (HARBORING ADULT PARASITES)

Year	Season	Percent Positive	Percentage Non-Effective to Mosquitoes	Percentage of Carriers
1926	Fall	29.5	18.1	11.4
1927	Fall	38.0	21.3	18.6
1928	Fall	19.0	8.9	10.1
1929	Spring	20.8	15.8	5.0
1929	Fall	12.3	8.8	3.5
1930	Spring	10.9	7.6	3.3
1930	Fall	14.0	10.6	3.4

Plasmochin has a decided effect upon the reduction of adult parasites (gametocytes) in the blood, as well as in devitalizing* this form of the parasite so that it does not complete its cycle, even though ingested by the biting mosquito. The principle of Plasmochin therapy, therefore, is a reduction in the number of carriers (those harboring gametocytes and crescent forms). Table VI shows the actual results accomplished in practice.

GENERAL REMARKS

Experimentation has demonstrated that many carriers do not always infect the biting mosquito or, if so, they are infectious only to certain species of the anopheline. Consideration of this natural selectivity or relative immunity of the mosquito and a reduction in the number of carriers on the one hand and a concurrent reduction of breeding areas or types of breeding areas on the other, leads to interesting speculation concerning the future. Will malaria disappear automatically from a locality when the carrier index reaches a certain point; and what will that point be? Can we be free from malaria with breeding areas still in existence? Is the susceptible mosquito domesticated, or is it the Sylvan strain? Does it breed under difficulty and thus succumb more readily to infection; or is it the robust strain that breeds so prolifically in clean water? Can we ignore the treatment of the habitat of one or the other? Perhaps these things will come to light when we have a lowered "carrier" index.

Many difficulties arise in the control of malaria; and one of these, with which we have to contend, is a moving population. Naturally, they bring in new strains of parasites; which may operate favorably or adversely, depending upon the prevailing mosquito of a locality. In theory, it would be easier to keep the malaria rate of a stable population under control; but with us, as in most tropical localities, a certain number of the population are of a nomad type which tends to introduce new elements into the problem.

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* Annual Report Medical Department United Fruit Company, 1928: "Observations and Experiments in the Panama Division of the United Fruit Company, With Special Reference to Certain Measures for the Control of Malaria"—M. A. Barber, M.D., W. H. W. Komp and B. M. Newman.

Annual Report Medical Department United Fruit Company, 1929: "The Action of Plasmochin in Rendering Subtertian Gametocytes Non-Infectious for Mosquitoes—Drs. Eugene R. Whitmore, C. M. Roberts, and W. Jantzen.

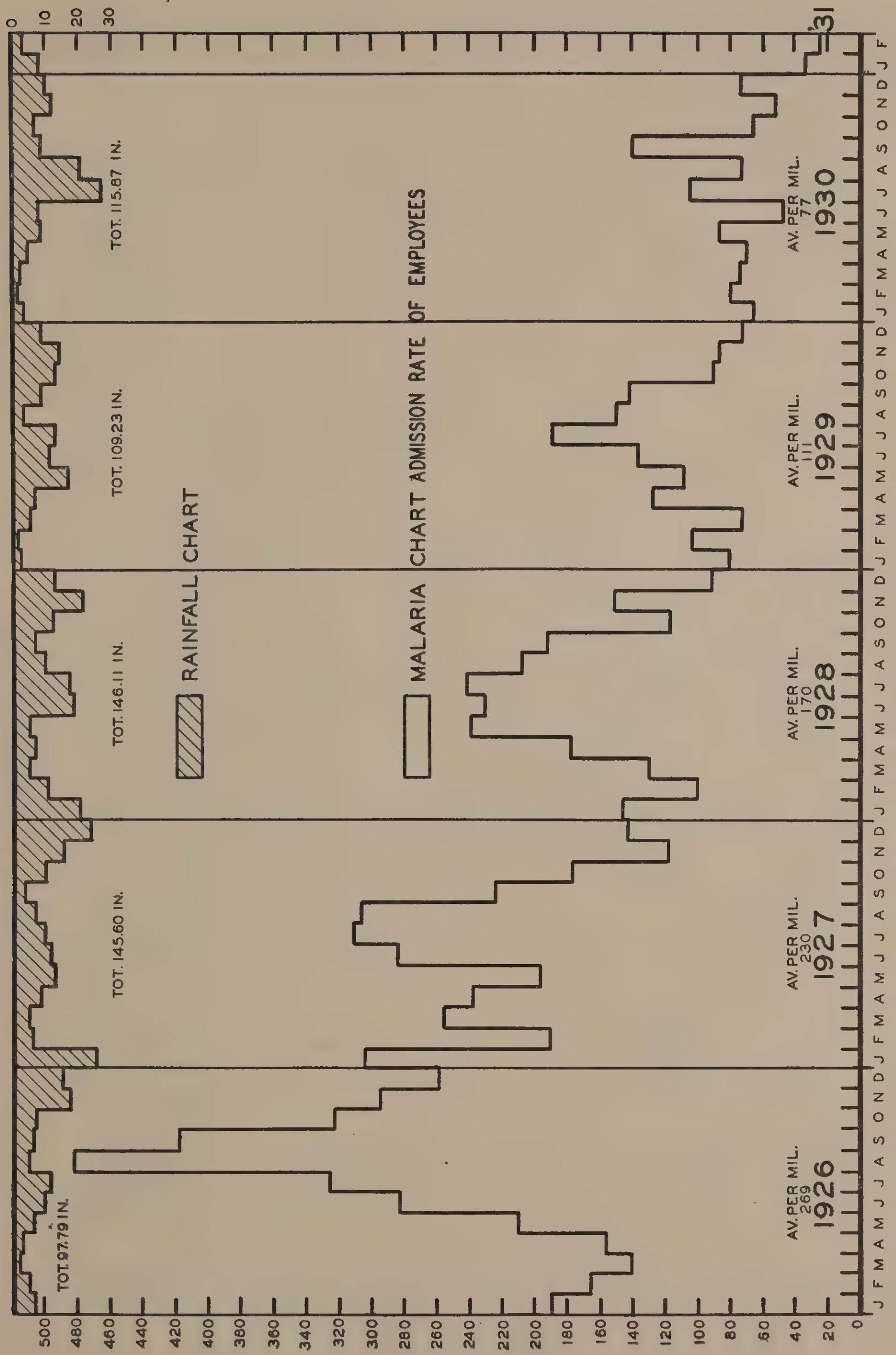
RAINFALL CHART
▨
MALARIA CHART ADMISSION RATE OF EMPLOYEES
☐
TOT. 97.79 IN.
TOT. 145.60 IN.
TOT. 146.11 IN.
TOT. 109.23 IN.
TOT. 115.87 IN.
AV. PER MIL. 269
1926
AV. PER MIL. 230
1927
AV. PER MIL. 170
1928
AV. PER MIL. 111
1929
AV. PER MIL. 77
1930
'31
0
10
20
30
500
480
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F

CHART I

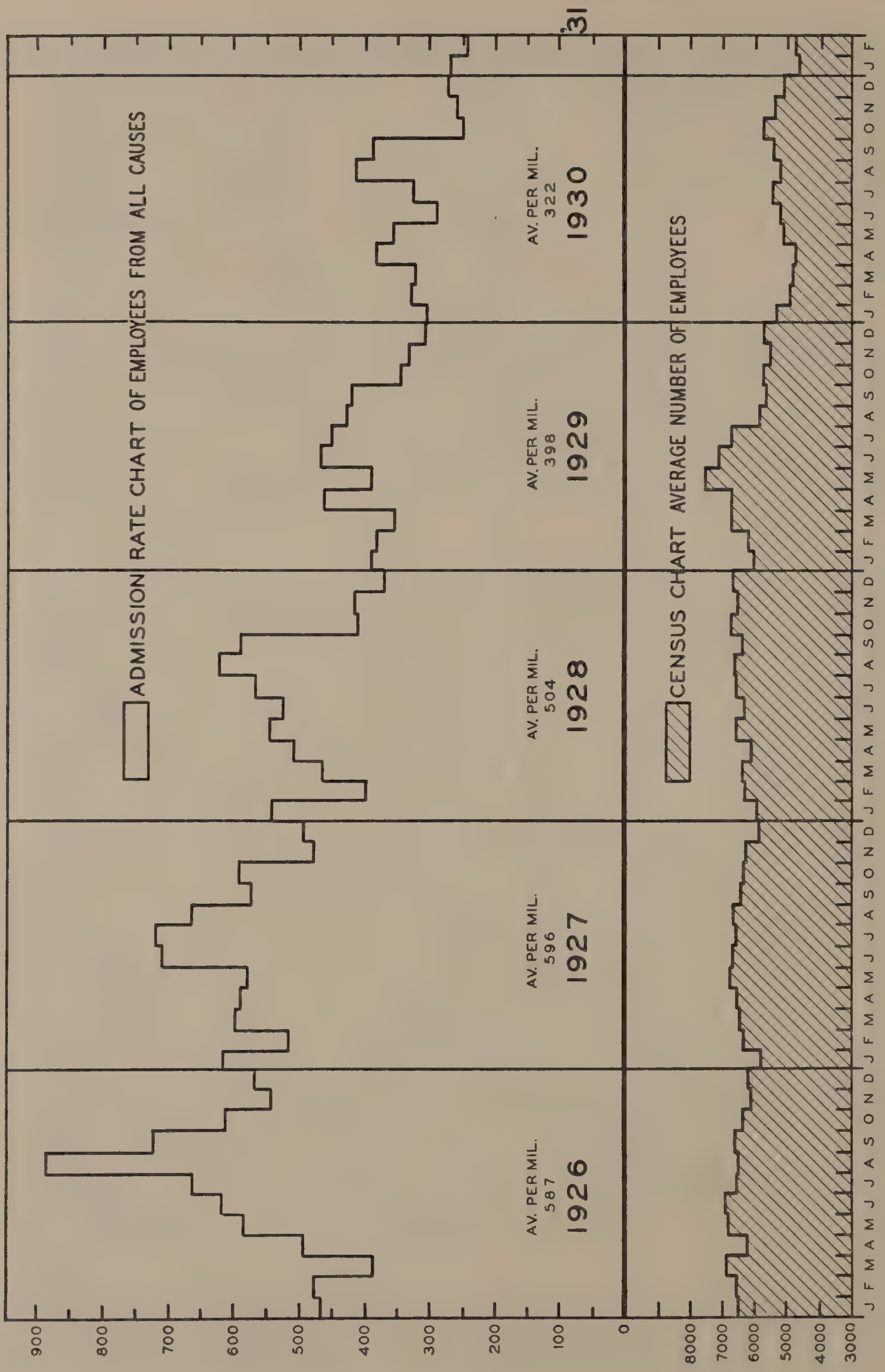
ADMISSION RATE CHART OF EMPLOYEES FROM ALL CAUSES
CENSUS CHART AVERAGE NUMBER OF EMPLOYEES
AV. PER MIL. 587
1926
AV. PER MIL. 596
1927
AV. PER MIL. 504
1928
AV. PER MIL. 398
1929
AV. PER MIL. 322
1930
'31
900
800
700
600
500
400
300
200
100
0
8000
7000
6000
5000
4000
3000
J F M A M J J A S O N D
J F M A M J J A S O N D
J F M A M J J A S O N D
J F M A M J J A S O N D
J F M A M J J A S O N D
J F

CHART II

The effect of our malaria-control campaign on the admission of employees with malaria to the Hospital, and its relation to the rainfall is shown graphically in Chart I. The calculation is based on the rate per thousand employees per annum and includes cases of secondary as well as primary diagnoses.

The effect of malaria-control work is reflected in the total hospital admission rate for all causes (See Chart II). It should be stated that the accident rate, which is included, remains nearly constant from year to year; and, therefore, has little effect on the general curve. The decline in malaria apparently has a beneficial effect by improving the general resistance of the employees to other infections.

THE ROLE OF PLASMOCHIN IN SANITATION

O. T. Brosius, M.D., D.T.M. & H., F.A.C.P.
United Fruit Company Hospital
Almirante, Panama

The introduction of plasmochin, alone and in its various compounds, and the laudable reports enthusiastically extolling its virtues as a gametocide seemed to prophesy to those who were interested in the study of tropical hygiene, the discovery of a most important sanitary adjunct to previously recognized malarial control measures. Further researches on the subject by M. A. Barber and W. H. W. Komp,[1] and by E. R. Whitmore,[4] working independently, convinced us that the plasmochin did not actually destroy the malarial gametocytes, but seemed rather to affect their fertility so that oocysts did not develop in the stomachs of mosquitoes which were fed on blood rich in gametocytes if the human host had been given a very small amount of plasmochin. Yet this was reassuring enough for us to believe that tropical sanitation had indeed been reinforced by a potent and promising auxiliary in the field of malarial control.

The measures which were considered previously to be most effective in anti-malarial work were:

(a) Treatment with Paris green dusting powder or with oil mixtures, of all anopheline breeding places within probable flying distance, or at least within a short radius of habitations.

(b) The inspection of all houses for anophelines, and the use of an effective insecticide spray. Mixtures of carbontetrachloride and kerosene have also been successfully used for this purpose.

(c) The use of screens of sufficiently fine mesh, (about 18 to the inch).

(d) Education regarding sanitary measures.

(e) Provision for a sufficient supply of the proper foods to maintain people in a good state of nutrition, whereby they are more resistant to the invasion of organisms such as the malarial parasites.

(f) Quinine prophylaxis. Unless given in sufficient dosage to effect a cure and thus stop the asexual cycles, quinine must be considered as of comparatively little value in malarial control; and, if it favors the increased production of sexual parasites, as some believe, it would be more of a menace than an aid in control work. It also seems probable that the incidence of blackwater fever is increased in vicinities where quinine is indiscriminately used as a prophylactic measure.

(g) Malarial surveys (at least semi-annually); and treatment of all those individuals who are found to be infected.

With the introduction of plasmochin, it seemed quite in order to speculate on the possibility of utilizing this preparation and discarding some of the more expensive sanitary measures which had been deemed necessary previously in attempting to combat malaria.

Although we were and still are, in a measure, in utter darkness concerning the duration of the anti-reproductive effect which plasmochin was demonstrated to exert on the malarial plasmodia (possibly through a chemical combination with the plasma); we were so optimistic with the glowing promises which the work of Barber and Komp offered, that we eagerly sought to test its worth as an economic asset. It was decided to eliminate some of the hereinbefore enumerated sanitary factors and to replace them by extensive plasmochin-compound distribution. Thus, in order to prove or disprove the virtues which had been claimed for plasmochin it was decided to practically abolish in this Division, two fundamental sanitary procedures—namely the use of larvicides, and the house-to-house inspections for detection and destruction of anophelines. This was early in 1928.

In a previous article[2] I reviewed in detail our observations in the Panama Division on the use of plasmochin as a sole sanitary measure to control malaria. A description of the manner in which the drug was administered for this purpose was detailed in Part 2 of another article[3] entitled "Plasmochin in Malaria," published in the same (1928) Annual Medical Report. Briefly, this consisted in conducting regular and complete divisional malarial surveys; and the subsequent treatment of all positives with a daily dosage (for adults) of quinine 1.75 grams and plasmochin .06 gram continued for from four to six consecutive days. A thick blood-film examination was made at the end of this period in order to check up the effect of the drug administration and the course of treatment was then repeated. After the second course of treatment, Pink Tonic Tablets were administered for eight days. In this earlier, more or less experimental work—i.e., until Dr. M. A. Barber and Mr. W. H. W. Komp and later Dr. E. R Whitmore,[4] demonstrated clearly that only a very small dosage of the drug was required to sterilize the sexual forms of the malarial plasmodia—we used considerably more plasmochin in the routine treatment of malaria than we do now. Barber, Komp and Newman[5] stated definitely that in their experience, "gametocytes in patients who have relapsed several weeks after plasmochin treatment are just as infective as those occurring during primary attacks." In consequence, we now prefer to administer our plasmochin in much smaller doses, administered intermittently throughout the course of malarial treatment. Then, too, if such an extremely small dosage of the drug has such a decidedly inhibitory effect on the reproductive powers of the malarial plasmodia, we cannot help but wonder if the comparatively large doses, such as were first recommended by some of the enthusiasts, might not have some such similar or other untoward effect on the human organism which might not yet have come under our observation, but for which we should still remain alert.

Having thus discarded mosquito-control for several months, we were disappointed when our malarial surveys began to show a decided increase of positives with, however, practically no increase in the number of malaria cases applying either to the Hospital or to the Dispensary clinics for treatment. Dr. M. A. Barber and Mr. W. H. W. Komp, who were conducting the surveys here at the time, assured us that, while the percentage of positives had increased, the number of heavy infections was definitely lowered. This was gratifying; but, discouraged with the increased percentage of positives shown, we reestablished our former system of mosquito-control at once, and in addition began giving complete blanket treatments throughout the entire division at semi-annual intervals in which quinine and plasmochin were both employed much in the same manner as in our treatments of the positives detected during former malarial surveys.

It was observed, later in the autumn of 1929, after the second entire divisional blanket treatment had been completed for that year, that there occurred a rapid and progressive decrease in the Hospital admissions as well as in treatments at the Dispensary clinics. This decrease was quite out of proportion to the more gradual decrease in the labor population which was taking place in the division; and such a remarkable decrease was particularly unexpected as the community contains a very large percentage of elderly and aged people among its employees. I ascertained that even in 1928 the average age for our Panama Division employees was 40.77. Dr. H. M. Walker, who was Medical Superintendent of the Division at that time, demonstrated clearly by the compilation of exhaustive statistics that the decrease, especially in the malaria, could not possibly be due to the efforts exerted by the sanitary department as was at first suggested, in that the inspector who conducted the mosquito control measures could not possibly cover the entire division in eight days—indeed, only exceptionally, were the camps visited at such short intervals. Dr. Walker stated that during his divisional sanitary inspections: ". . . . heavy breeding, including full-grown larvae as well as numerous pupae, were found in a number of places, showing ineffective dusting; and adults were found quite numerous in the camps. These conditions, as well as Mr. Komp's surveys (while not extensive and including only the camps that formerly recorded the highest rates of infection) which demonstrated that the rate was approximately the same as during the previous years, seem to indicate that some factor other than larviciding has had an influence. That factor would seem, theoretically, to be the apparently delayed effects of plasmochin."

Mr. Komp's tabulation of the malarial rate in some of the more important camps for the last three years is as follows:

	1928			1929			1930		
	No. Examined	No. Positive	Percent Positive	No. Examined	No. Positive	Percent Positive	No. Examined	No. Positive	Percent Positive
One Mile	407	35	8.6	62	10	16.1	100	12	12.0
Dos Canos	103	42	40.6	56	22	39.3	48	12	25.0
Base Line School . . .	65	17	26.1	49	13	26.5	44	11	25.0
Feild's	40	12	30.0	53	14	26.4	33	20	60.6
Chase	Not examined			50	18	36.0	45	13	28.6
Olivia	Not examined			33	7	21.2	33	13	40.0
Margarita	33	7	21.2	75	35	46.6	39	16	41.0
Chiriquicito	33	18	54.5	80	56	70.0	66	11	16.6
Guabito	185	50	27.0	100	18	18.0	92	16	17.4
Totals	1029	214	20.8	575	185	32.2	500	124	24.8
Children's Rate . . .	450	107	23.7	261	91	34.8	229	63	27.5

We were indeed surprised that the reports of Mr. Komp's surveys showed just as high a malarial rate as in former years; but were pleased to find that there were very few heavy infections, that gametocytes were decidedly rare, and that the percentage of tertian was extremely low. At the conference which followed these revelations, it was suggested that in all probability the plasmochin had not been as effective in its action on the estivo-autumnal as it had on the tertian type; although its remarkably potent effect on the latter had resulted in a marked reduction in the actual malarial rate and the drug had apparently enabled us to practically eliminate the tertian type of the disease which is the one more prone to relapse. This proved most unconvincing to me, however, after my experience in the Chiriqui Division where the tertian type showed no greater rate of decrease than the subtertian type and relapsed frequently despite constant and vigorous administration of plasmochin during our surveys, both at the time of taking the blood as well as in the subsequent treatment of our positive cases. Then, also, while estivo-autumnal malaria is the insidious type, it is more often responsible for the serious and dangerously ill cases that arise. In this connection I am morally certain that, since using plasmochin in the Panama Division for a period of over three years, we do not see nearly as many serious cases of malaria as we did before the introduction of this comparatively new drug; although this does not seem to be substantiated by the following tabulation:

Year	Hospital Malarial Cases	Fatal Cases of Malaria	Fatality Rate per Thousand
1925	1007	8	7.9
1926	694	10	14.4
1927	441	6	13.6
1928	507	3	5.9
1929	295	4	13.6
1930	140	3	21.4

Simultaneously, with the reduction of the malarial index a decrease in the general morbidity rate was also noticed, as is shown by the following table:

Year	Total No. of Employees	Total No. of Hospital Admissions	No. of Admissions of Employees	Total No. Positive for Malaria (Primary Diagnosis)	Employees Positive for Malaria (Primary Diagnosis)	Total No. Positive for Malaria (Secondary Diagnosis)	Employees Positive for Malaria (Secondary Diagnosis)
1925	3312	2999	2208	1007	763	246	199
1926	3092	2802	1970	694	510	314	250
1927	2804	2170	1479	441	310	111	85
1928	2690	2390	1584	507	323	90	65
1929	2551	1721	1087	295	178	53	41
1930	2346	695	439	140	96	69	47

It was expected, at first, that the drop in the number of Hospital cases would be temporary; but all through the year 1930 the rate of Hospital admissions remained low in comparison with other years. Furthermore, the reduction was far too great to be attributed primarily to the decrease in the number of employees in this division. It is true, however, that we were not visited by any epidemic during the past year.

AVERAGE DAILY HOSPITAL CENSUS DURING THE PAST SIX YEARS

Year	Number of Employees	Average Daily Hospital Census
1925	3312	102.37
1926	3092	90.69
1927	2804	84.94
1928	2690	87.74
1929	2551	62.16
1930	2346	21.48

In Table I we have shown the Average Daily Hospital Census for the respective months of 1930; and the Number of Malaria Cases Admitted to the Hospital during each month, as well as the Rainfall for the respective periods:

TABLE I

Month	Average Daily Hospital Census	Malarial Cases Admitted to Hospital	Rainfall (Inches)
January	27.11	18	2.73
February	14.18	8	8.07
March	17.75	13	2.80
April	22.18	12	8.02
May	21.26	22	9.44
June	26.00	13	5.31
July	25.77	42	21.33
August	19.00	17	20.25
September	22.32	30	9.71
October	18.80	16	2.43
November	18.64	8	4.92
December	18.40	10	7.34

In order to take care of the only alarming malarial increase during the year, which occurred in Almirante, two complete blanket treatments were given in the manner described below to all inhabitants—the Company's employees and outsiders alike—and all breeding places were carefully treated with Paris green dusting powder at regular intervals. This breeding was found distinctly outside of the Company's property but had to be treated, nevertheless, in order to protect our own people.

In April, 1930, a complete blanket treatment over the entire division was begun. The dispenser devoted three days each week to each camp, giving two treatments a day to all individuals who would coöperate. The medicine was dispensed to the laborers early in the morning before they went out to work and again after their return to camp at night; while the women and children were treated twice during the day. Each adult at each treatment received two 5-grain quinine tablets and two plasmochin compound tablets, while the dose for children was modified according to age. Tonic tablets were left with these individuals whom the dispenser believed would take them. During the time available between the administration of treatments the dispenser inspected all of the houses in the camp for adult anophelines and sprayed the quarters with an insecticide. Any additional time which remained was devoted to short radius inspections for anopheline breeding places.

The following data will indicate the relative degree of coöperation received from the occupants of the camps:

Total Number in Camps and Environs	No. Taking 6 Treat.	No. Taking 5 Treat.	No. Taking 4 Treat.	No. Taking 3 Treat.	No. Taking 2 Treat.	No. Taking 1 Treat.	No. Taking No Treat.
4,886	2,005	697	503	505	351	233	592

The reasons for prescribing so large a dosage of plasmochin in these blanket treatments were:

1. We knew that all individuals would not report; and we wanted to be sure that those who did not take all of the prescribed medicine would receive as nearly a sufficient amount as possible.
2. We do not know how long the anti-reproductive quality produced on gametocytes by very small doses of plasmochin may last; and it was considered possible that slightly larger but still safe dosages might prolong this action of the drug.
3. We still feel that plasmochin has some therapeutic effect on the schizonts as well as on the gametocytes.

BLACKWATER FEVER CASES

It has been observed before that blackwater fever cases seem to increase whenever quinine prophylaxis or quinine blanket treatments are instituted in a given community which is highly infected with malaria; and this is more or less substantiated by our experience, as shown by the following chart indicating the proportion of hemoglobinuric cases which occurred in this Division during the last seven years.

Year	Total Hospital Admissions	Malaria Cases—Primary and Secondary Diagnosis	Blackwater Fever Cases—Primary and Secondary Diagnosis	Deaths from Blackwater Fever
1924	3,291	2,807	9	3
1925	2,999	1,253	9	3
1926	2,802	1,008	4	2
1927	2,170	552	4	0
1928	2,390	597	7	1
1929	1,721	348	7	0
1930	695	209	15	1

It is considered by some clinicians that both plasmochin and quinine will, in certain given cases, produce hemoglobinuria; but I believe that these cases, when they do arise, are seldom as serious and are very rarely attended by as high a percentage of mortality as are those whose etiology is still more obscure. In order that plasmochin will not be considered as the absolute cause for the cases of blackwater fever arising during the 1930 blanket treatments, I will submit a few case reports, as follows:

Case No. 1.—A young mestizo woman, aged 23, well developed and well nourished, was admitted to the Hospital on June 4, 1930, with hemoglobinuria. Her blood-smear was positive for estivo-autumnal malaria. She was treated at once with sodium bicarbonate, caffeine sodio-benzoate and tincture of digitalis, and with hot compresses over both kidneys. Because the blood showed the presence of malarial parasites, small doses of quinine sulphate of only 2½ grains three times a day were begun on the third day after admission. Even though the dosage of quinine was quite small, the temperature, which had been normal, rose on the following day to 101.6°F., accompanied by a slight chill. The quinine was discontinued; and caffeine sodio-benzoate was again administered, together with anti-bothrops serum. By the eighth day the temperature was again normal, and the patient showed great improvement. After this, plasmochin compound tablets were administered q.i.d., for three days more, without causing any ill effects; and the patient was then discharged.

About two weeks after her discharge, on July 2, she was again readmitted to the Hospital with hemoglobinuria and mixed estivo-autumnal and tertian malaria. She was given sodium bicarbonate and two plasmochin compound tablets, three times a day. By the evening of July 4, the hemoglobinuria had disappeared completely; but it returned again on the following day accompanied by considerable prostration and marked pains over both kidney regions. As the fever had not subsided with the disappearance of the hemoglobinuria, the thick-blood film indicated a rather heavy infection of mixed malaria, and the patient now began vomiting all medication as well as most of her food; it was decided to begin the administration intramuscularly of quinine dihydrochloride, together with adrenalin chloride—beginning with very small dosages of the quinine and working up to fifteen grains twice a day. Both the fever and a recurrent hemoglobinuria subsided very slowly; and her convalescence this time was so prolonged that she was not discharged from the Hospital until a month after her admission.

Case No. 2.—A mestizo youth, aged 25, well developed and well nourished, was admitted to the Hospital on June 5, 1930, with hemoglobinuria and estivo-autumnal malaria. His temperature was 100°F. on admission but it returned to normal the next day under a treatment consisting of sodium bicarbonate and caffeine sodio-benzoate. On June 7, quinine sulphate was added to the treatment, giving five grains three times a day. That night the temperature rose to 102°F.; and on the next day it rose to 104°F., and was accompanied by an aggravation of the hemoglobinuria and considerable prostration and distress. The quinine was discontinued; and both the hemoglobinuria and the fever disappeared completely by June 10. Four plasmochin compound tablets were then administered each day, for three days; and subsequently, Pink Tonic Tablets were given until the day of discharge, June 17, 1930.

On July 1, this young man was readmitted with the same symptoms as at the time of his first admission, except that this time the blood film showed a heavier infection than previously of the estivo-autumnal malaria. His condition improved gradually under treatment with plasmochin compound and sodium bicarbonate; but, because of the rather heavy infection of malaria found in his blood, quinine was added to the treatment in small doses (2½ grains three times a day) beginning July 6. The dosage of the quinine was increased gradually each day until, by July 10, ten grains were being given three times a day. At this time there was a sudden rise of temperature to 102°F., with marked toxicity but no hemoglobinuria—simply a reddish, febrile urine with a faint trace of albumin. Largely because of a persistent vomiting, intramuscular injections of the dihydrochloride of quinine together with adrenalin chloride were begun; and were continued until both the vomiting and the fever had discontinued.

Case No. 3.—A young male mestizo, Nicaraguan, aged 22, was admitted to the Hospital on August 15, 1930, with a history of having had fever for 5 days. Because he had suffered from blackwater fever before, quinine treatment was begun on admission with the small dosage of only 5 grains. After the fourth of these small doses had been taken, hemoglobinuria appeared; and consequently caffeine sodio-benzoate and sodium bicarbonate were given in place of the quinine. On August 17, treatment with plasmochin compound was begun with but one tablet three times a day. On August 19, 2½ grains of quinine, q.i.d., was added to the treatment. This was increased gradually, to five grains, t.i.d., and subsequently to five grains q.i.d., and, later, Pink Tonic Tablets were added to the treatment. On August 23, hemoglobinuria again returned, and was again treated with caffeine sodio-benzoate, and sodium bicarbonate.

COMMENTS ON BLACKWATER FEVER CASES

The three cases cited above are of the type which we occasionally see in our wards; and which are apparently provoked by some form of medication—generally by quinine or by plasmochin. In my article entitled "Plasmochin in Malaria," published in the Sixteenth Annual Report of the Medical Department of the United Fruit Company (1927), I mentioned several such cases which I considered had been provoked by plasmochin or plasmochin compound. However, quinine is known to exert the same untoward influence; and in consequence, if any increase in this unfortunate and obscure complication resulted from the blanket treatments, only a portion of the blame can possibly be attributed to plasmochin as both drugs were administered. I believe it is safe to assert that the dihydrochloride is tolerated better in this type of cases than is the sulphate of quinine. A case illustrating the rather more severe type of the disease, which is still of obscure etiology and is most probably unprovoked by any form of medication, is presented as follows:

Case No. 4.—A young mestizo woman, aged 22, and a native of Costa Rica was admitted to the Almirante Hospital early in the morning of October 1, 1930, complaining of fever, malaise, extreme weakness, severe headache, nausea, vomiting, and pains in both flanks and in the small of back. She declared that the fever had come on suddenly the preceding afternoon, and that she had had a severe chill earlier that evening. Diagnosing her own condition, she brought a specimen of jet-black urine with her which she had passed just after she had had the chill. She denied ever having had this disease before, and assured us that she had taken no medicine whatsoever before applying to the Dispenser for treatment who sent her in to the Hospital at once. She had never taken plasmochin to her knowledge; and, although she had taken quinine on several occasions for attacks of malaria from which she had suffered in the past, she had never had any ill effects from this drug other than the usual deafness, tinnitus aurium, and dizziness which frequently attends its ingestion.

The physical examination revealed: A brown mestizo woman, well developed and well nourished; but heavily jaundiced. Many of the teeth showed dental caries, and there were evidences of pyorrhea. Heart and lungs were normal. The abdomen was slightly tender, and especially in the two upper quadrants. The spleen was enlarged to about three finger-breadths below the costal margin; and the liver was quite tender, with the lower margin palpable.

Laboratory tests showed: black urine, with a large amount of albumen; haemoglobin, 65%; white blood count, 7,000; thick-blood film, positive for estivo-autumnal malaria.

Treatment with caffeine sodio-benzoate and sodium bicarbonate was begun at once. Her condition gradually became worse, as the urinary suppression began. On October 2, an intramuscular injection of fifteen grains of quinine dihydrochloride was administered together with twelve drops of adrenalin chloride. As her condition became gradually more alarming, hemostatic serum was injected later in the evening. From the morning of October 2, until the time of her death some 24 hours later, she did not void once; but lapsed gradually into delirium and then into coma.

The blanket treatments of quinine and plasmochin for the entire Division were concluded at the end of October, 1930; and, in order to determine whether or not any reduction of the malarial index had been effected, a malarial survey was made of all the camps in the Division, beginning November 5, and ending December 1, 1930, the tabulation of which is as follows:

Name of Camp	Total Examined	Positives	Percentage Positive
Farm 4	72	7	9.72
Farm 10	65	6	9.23
Farms 8, 9 and Base Line	115	12	10.43
Farms 2 and 3	148	13	8.78
Farm 1	29	—	—
Farms 5 and 6	122	15	12.29
Guabito	174	22	12.64
California	85	8	9.41
San San	90	9	10.00
Isla Grande	26	3	11.53
Barranco	50	5	10.00
Nievecito	31	2	6.45
Dos Canos	67	13	19.40
Elena	70	6	8.57
Sibubi and Senosri	83	6	7.22
La Palma	20	3	15.00
Virginia	74	11	14.86
Sixaola Banana Co.	70	13	18.57
Costa Rica Farm	48	3	6.25
La Celia	26	2	7.69
Daytonia	67	10	14.92
Zavala	14	1	7.14
Paraiso	49	4	8.16
Catarina	39	3	7.69
Margarita	53	6	11.32
Olivia	30	2	6.66
Feilds	43	7	16.27
Chase	92	8	8.69
Totals	1,852	200	10.79

In the United Fruit Company's Annual Medical Report for 1928, under the title of "Supplementary Notes After Malaria Survey Reports," is included a complete outline of previous surveys.

CONCLUSION

There is probably little to be concluded from the data contained in this paper save, perhaps, that plasmochin may have played a rather more active rôle in effecting a reduction in malaria infections than it was given credit for in our earlier attempts to determine its exact value in tropical sanitation. Its *modus operandi* may be more or less insidious and its effects be latent. Furthermore, it is emphasized that, with the malarial reduction, there was a simultaneous decrease in the Hospital admissions, which was in more or less direct ratio to the malaria decline, but decidedly greater than the decrease in the number of employees, despite the fact that those beyond middle life almost predominate in the labor contingent.

I am of the opinion that plasmochin has a decided value in a community such as the Panama Division, where there is a comparatively limited turnover in labor and, consequently, by sufficiently frequent plasmochin and quinine blanket treatments the sterilization of the gametocytes in the carriers can be repeated at given intervals. It is quite obvious that communities with large and continuous labor turnover would profit more by devoting stricter attention to larvicidal measures and destruction of adult mosquitoes than by blanket treatments, though it would seem inadvisable to entirely discontinue the latter.

It is possible that there is an increase in hemoglobinuria where blanket treatments of quinine and plasmochin are administered, or where quinine prophylaxis is practiced. To counteract this, however, I feel certain that, where these blanket treatments are given regularly, there is a substantial reduction in serious cases of malaria. It is unreasonable to suppose that plasmochin is responsible in any greater degree than quinine for any such increase in hemoglobinuria.

In his article in the Journal of the American Medical Association, of October 4, 1930, entitled "The Treatment of Malaria," Dr. C. C. Bass, in referring to one of my articles on plasmochin, remarked: "Brosius reported ten, or $16\frac{2}{3}\%$, of sixty patients taking as much as 0.06 gm. daily as suffering from cyanosis, hemoglobinuria, nausea, headache or relapse." This was in the experimental stage when we still used the drug in accordance with the recommendations of the German investigators who first introduced it. Moreover, the group of symptoms to which Dr. Bass alluded was very seldom alarming; and, indeed, I have seen equally serious untoward symptoms and signs (though far less common) result from quinine idiosyncracy. In our present method of administration, whereby we give to our Hospital patients only 2 or 3 plasmochin compound tablets a day for three days and repeat the dosage again after about a week of strictly quinine treatment, we never see any of the untoward signs referred to by Dr. Bass.

During the ensuing year, it is our plan in this Division to administer more frequent divisional blanket treatments, and to give still smaller doses of plasmochin in accordance with the recommendations of Dr. W. E. Deeks to determine whether the result will be equally as effective.

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QUININE-PLASMOCHIN COMPOUND IN MALARIA

VICENTE BUSTILLO, M.D.

United Fruit Company Hospital

Banes, Cuba

INTRODUCTION

The most difficult problems encountered in the anti-malaria campaign being carried on in the Banes Division are (1) the aversion that the laboring classes have to quinine and (2) the continuous ingress of new laborers throughout the crop season, many of whom are infected with malaria. Our laboring class is composed of Cubans, Haitians, Jamaicans and a few Spaniards. In previous years a large contingent of Haitians, up to 5,000 men, were imported into the Division at the beginning of each crop season, with the understanding that they were to be repatriated at the end of the crop.

The incidence of malaria infection among this Haitian labor upon arrival averaged between 25% and 40%, while among the native Cubans and others the usual percentage of infection, as shown by repeated surveys, would be between

10% and 20%. For the crop beginning January 1930, no Haitian labor was imported. In their stead a number of Cuban families from various parts of the island (mainly from Santa Clara province) were brought in and colonized in order to stabilize labor. The incidence of infection among these, upon their arrival, was found to be 15%.

ANTI-MALARIA CAMPAIGN

The general measures adopted for malaria control are as follows:

1. (a) Repeated blood examinations in the various camps of those individuals suspected of being infected. (b) Treatment of those found infected for as long a period as possible, with reëxamination of their blood at frequent intervals.
2. Continuous education of the people regarding prophylactic sanitary measures and the necessity for taking quinine when suffering from the disease.
3. Careful search for anopheles breeding areas and destruction of larvae with a Paris green and dust mixture (1:100), by a sanitary squad composed of one sanitary inspector and 4 men.

ROUTINE MALARIA TREATMENT

Our routine malaria treatment consists in the administration of two ounces of concentrated magnesium sulphate solution the first day, followed by 10 grains of quinine twice a day, and 1 plasmochin compound tablet (0.01 gram of plasmochin) daily until 4 are taken when the administration of plasmochin is discontinued. Children under 5 years of age receive 0.005 gram of plasmochin daily for a period of 8 days, while the dosage of quinine is modified according to age. It has been deemed wise to give children the same *total* quantity of plasmochin that adults receive as we were uncertain whether a lesser total quantity would have the desired effect on the gametocytes, but a smaller daily dosage is administered to children in order to avoid the possibility of the development of toxic effects. No untoward effects whatsoever have ever been noticed with the dosage of plasmochin mentioned. The administration of 10 grains of quinine twice daily is continued until the patient has a normal temperature for 6 to 8 days, when he is instructed to take 3 Pink Tonic Pills daily and one 5-grain quinine tablet every night for a period of two months. Plasmochin treatment is only given in the initial stages of an attack, in the manner described above; but is repeated in cases of relapses. Injections or larger doses of quinine are only used in the more severe forms of the disease.

SUMMARY OF CASES TREATED

Hospital Cases.—From July, 1928, to May, 1929, there were admitted to the Haitian Ward of the Banes Hospital 107 cases of Malaria, of which 104 were estivo-autumnal (sub-tertian), 2 quartan and 1 tertian. A thick blood film examination was made immediately upon the admission of each patient and repeated on alternate days in those found infected.

As shown in Tables I, II and III, presenting the results obtained in each group, these 107 cases can be classified into three groups, as follows:

Group I.—16 cases which had gametocytes in the peripheral circulation at the first examination. These were given the routine treatment above described, including quinine and plasmochin compound, from the time of admission.

GROUP I

CASES SHOWING GAMETOCYTES ON ADMISSION—TREATED WITH QUININE AND PLASMOCHIN

Cases	1st Day On Admission	3rd Day Second Exam.	5th Day Third Exam.	7th Day Fourth Exam.	9th Day Fifth Exam.	11th Day Sixth Exam.	13th Day Seventh Exam.	14th Day
1	Ox Cx	—	—	—	—	D.		
2	Oxx Cxx	Cx	—	—	—	D.		
3	Oxx Cxx	Cx	Cx	—	—	—	D.	
4	Oxx Cx	—	—	—	—	D.		
5	Ox Cx	Ox	—	—	—	D.		
6	Ox Cx	Cx	—	—	—	D.		
7	Ox Cxx	Ox Cx	Cx	Cx	—	—	—	D.
8	Ox Cx	Cx	Cx	—	—	—	D.	
9	Cx	Cx	Cx	Cx	Cx	Cx	—	D.
10	Cx	—	—	—	D.			
11	Ox Cx	Ox	Ox	—	—	D.		
12	Oxx Cx	—	—	—	D.			
13	Cxx	—	—	—	D.			
14	Oxx Cxx	Oxx Cxx	Cx	—	—	D.		
15	Cxx	Cx	—	—	D.			
16	Oxx Cx	Ox	—	—	D.			

D. = Discharged.

Group II.—49 cases which did not have gametocytes at the first examination, and which were given the routine treatment from the time of admission. In the group so treated, 7 cases or 14.29% showed gametocytes for the first time on the second or third examination—5 in the second and 2 in the third. All seven had gametocytes on the third examination; and three were still positive on the fourth, and one on the fifth, examination. The remaining cases became negative without showing any crescents.

GROUP II

CASES NOT SHOWING GAMETOCYTES ON ADMISSION—TREATED WITH QUININE AND PLASMOCHIN

	1st Day	3rd Day	5th Day	7th Day	9th Day	11th Day	13th Day
Cases	On Admission	Second Exam.	Third Exam.	Fourth Exam.	Fifth Exam.	Sixth Exam.	Seventh Exam.
1	Ox	Ox	—	—	D.		
2	Ox	—	—	—	D.		
3	Ox	—	—	—	D.		
4	Oxx	Ox	—	—	D.		
5	Oxx	Ox	—	—	D.		
6	Ox	—	—	—	D.		
7	Ox	Ox	—	—	D.		
8	Ox	—	—	D.			
9	Oxx	Ox	Cx	Cx	—	D.	
10	Oxx	—	—	—	—	D.	
11	Ox	—	—	—	—	D.	
12	Ox	—	—	—	—	D.	
13	Oxx	—	—	—	—	D.	
14	Ox	—	—	—	—	D.	
15	Ox	—	—	—	D.		
16	Ox	—	—	—	D.		
17	Quartan	Qx	—	—	D.		
18	Oxx	—	—	—	D.		
19	Ox	Cx	Cx	Cx	Cx	—	D.
20	Ox	—	—	—	D.		
21	Oxx	Cxx Ox	Cx	—	—	D.	
22	Ox	Cx	Cx	—	—	D.	
23	Ox	Ox	Cx	—	—	D.	
24	Ox	Cx	Cx	—	—	D.	
25	Ox	Ox	—	—	—	D.	
26	Oxx	Ox	—	—	—	D.	
27	Tertian	—	—	—	—	D.	
28	Ox	—	—	—	—	D.	
29	Ox	Ox	—	—	—	D.	
30	Oxx	Ox	—	—	—	D.	
31	Ox	—	—	—	—	D.	
32	Ox	Ox	—	—	—	D.	
33	Ox	—	—	—	—	D.	
34	Ox	—	—	—	—	D.	
35	Oxx	—	—	—	—	D.	
36	Ox	—	—	—	—	D.	
37	Ox	—	—	—	—	D.	
38	Ox	Ox	—	—	—	D.	
39	Oxx	—	—	—	—	D.	
40	Ox	—	—	—	—	D.	
41	Ox	Ox	—	—	—	D.	
42	Ox	—	—	—	—	D.	
43	Ox	—	—	—	—	D.	
44	Ox	—	—	—	—	D.	
45	Ox	—	—	—	—	D.	
46	Oxx	Ox	—	—	—	D.	
47	Oxxx	Ox	—	—	—	D.	
48	Ox	—	—	—	—	D.	
49	Oxxx	Ox Cxx	Cx	Cx	—	D.	

D. = Discharged.

GROUP III

CASES NOT SHOWING GAMETOCYTES ON ADMISSION—TREATED WITH QUININE ONLY, BUT PLASMOCHIN ADDED IF GAMETOCYTES APPEARED

	1st Day	3rd Day	5th Day	7th Day	9th Day	11th Day	13th Day	14th Day
Cases	On Admission	Second Exam.	Third Exam.	Fourth Exam.	Fifth Exam.	Sixth Exam.	Seventh Exam.	
1	Ox	Ox	—	—	—	D.		
2	Ox	—	—	—	—	D.		
3	Ox	—	—	—	—	D.		
4	Oxx	Oxx Cxx	Cxx	Cxx	Cx	Cx	—	D.
5	Oxx	Oxx	—	—	—	D.		
6	Oxx	—	—	—	—	D.		
7	Oxxx	Ox	—	—	—	D.		
8	Ox	—	—	—	—	D.		
9	Oxxx	Ox	—	—	—	D.		
10	Ox	Ox	—	—	—	D.		
11	Ox	Ox	Ox	—	—	D.		
12	Ox	—	—	—	—	D.		
13	Oxx	Ox Cxx	Cx	—	—	D.		
14	Oxx	—	—	—	—	D.		
15	Ox	—	—	—	—	D.		
16	Oxx	Ox	—	—	—	D.		
17	Ox	—	—	—	—	D.		
18	Oxx	Ox	Ox	—	—	D.		
19	Ox	—	—	—	—	D.		
20	oxx	Cx	Cx	—	—	D.		
21	Ox	Ox	—	—	—	D.		
22	Ox	—	—	—	—	D.		
23	Oxx	Cx Ox	Cx	Cx	Cx	—	D.	
24	Oxx	—	—	—	D.			
25	Oxx	Cx	—	—	D.			
26	Oxx	—	—	—	D.			
27	Oxx	—	—	—	D.			
28	Oxx	Cx	—	—	D.			
29	Ox	—	—	—	D.			
30	Quartan	—	—	—	D.			
31	Ox	—	—	—	D.			
32	Ox	Ox	—	—	D.			
33	Oxx	Cx	—	—	—	D.		
34	Ox	—	—	—	D.			
35	Oxx	Cx	—	—	—	D.		
36	Oxx	—	—	—	D.			
37	Oxx	—	—	—	D.			
38	Oxx	Cx	—	—	—	D.		
39	Ox	—	—	—	D.			
40	Oxx	Cx Ox	Cx	—	—	D.		
41	Ox	—	—	—	D.			
42	Oxx	Cx	—	—	—	D.		

D. = Discharged.

Group III.—42 cases which did not show gametocytes at the first examination and which were treated by giving quinine alone on admission; the plasmochin compound being added after the appearance of the gametocytes. In this group, 11 cases or 26.19% showed gametocytes at the second examination (3rd day following admission); and 5 were still positive on the third, 2 on the fourth, 2 on the fifth, and 1 on the sixth examination. The remaining cases became negative without showing gametocytes.

Field Cases.—From January, 1930, to November, 1930, 355 new cases of malaria were found in the Deleite Dispensary, all of which were treated as described above. Reëxamination of their bloods were made at different periods; and a more careful search was made during September, October, November and December, when 254 of the 355 cases were reëxamined. The remaining cases had either left the Division or were not to be found at the time of the inspection. Of these 254 cases, relapses or reinfections occurred in 15 or 5.91%; and all 15 had subtertian infections on both occasions.

During October a general survey of the Division gave an incidence of 0.80%. This general survey included Haitians, Cubans, Spaniards and others; 850 thick blood drops were examined and 7 cases found positive. This survey was not selective, and all persons in the camps were examined, including a number of individuals who had previously been positive malaria cases. Of the 7 positive cases found during the survey, 2 had previously been found positive for malaria and were included in our list of field reëxaminations and in our 15 positive cases.

CONCLUSIONS

1. Since 31 of the 34 cases showing crescents became negative within less than nine days subsequent to the initiation of plasmochin treatment and 3 after the ninth day but before the thirteenth day, we may safely state that the doses of plasmochin here used are sufficient to cause a disappearance of gametocytes from the peripheral circulation in from 1 to 8 days in 91% of the cases and in from 9 to 12 days in the remaining 9%.
2. The early disappearance of gametocytes in many cases might lead one to believe that plasmochin has a direct action on them. The work of Whitmore, Barber and Komp has shown that small doses of plasmochin are sufficient to devitalize the gametocytes; and, in consequence, I have concluded that in those of our cases in which their disappearance occurs late they have already been devitalized earlier in the course of treatment and their final disappearance is caused by a process of phagocytosis.
3. Judging from the results observed in the survey, the reduction in Hospital cases and the small percentage of positive blood smears found in the last field reëxamination made, we may tentatively assume that our present anti-malarial measures as described are efficacious in controlling the disease.

EXPERIMENTAL EFFORTS TO TRANSFER MONKEY MALARIA TO MAN*†

HERBERT C. CLARK AND LAWRENCE H. DUNN

From the Gorgas Memorial Laboratory, Panama, Republic of Panama

A preliminary report on malaria in wild monkeys of Panama was made by the senior author (1) about one year ago but no success attended his efforts to secure a living specimen showing the disease. A later expedition has been made that did secure six juvenile and two infant monkeys with malaria. These animals were captured in the uninhabited portion of Panama known as the Coto and then transferred to our laboratory and placed in screened quarters.

Several experiments in the transfer of monkey malaria to man have been made in the Eastern hemisphere that produced refractory results or were surrounded with circumstances that seemed to leave the question in doubt. In view of the fact that our Western hemisphere monkey malaria is difficult if not impossible to distinguish from human quartan and tertian malaria, it seemed wise to repeat such experiments in our region.

Our experiments have been done in collaboration with the Gorgas Hospital and the Panama Canal Department of the United States Army. The former supplied the necessary hospital requirements and the latter, through the splendid support of the Commanding General of the Department and the Surgeon at the Corozal Post, secured human volunteers and selected from them the class of men desired for the work. We sought for young men who had lived in Northern States where malaria was not endemic and who had never left those regions until assigned to military duty on the Isthmus. During the month of March, 1930, eight volunteers were accepted. Note table 1 for the salient points of interest to us.

MONKEYS USED IN EXPERIMENT

Three juvenile and one infant red spider monkey (*Ateles geoffroyi* Kuhl) brought from the jungle of the Coto, Republic of Panama and having naturally acquired malarial infections were used as the donors in attempts to infect men and mosquitoes. One juvenile black spider monkey (*Ateles dariensis* Goldman) and one white faced monkey (*Cebus capucinus imitator* Thomas) were used as control animals against the direct blood method used on the men. These two monkeys had spent most of their lives in captivity and were negative daily over a long period of blood film examinations.

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TABLE 1

Name	Age	Time on Isthmus Days	Home State
R. F. A.	19	14	Michigan
E. C.	21	11	Michigan
A. A. R.	22	14	Michigan
O. A. D.	20	30	Wisconsin
H. J. B.	18	14	Connecticut
A. D.	21	7	Pennsylvania
J. H. K.	21	7	Pennsylvania
C. R. G.	21	7	Iowa

The three juvenile red spider monkeys (Lab. Nos. 3, 4 and 6) were carrying a moderate degree of malarial infection. The infant red spider monkey (Lab. No. 7) was seriously ill with malaria and died before the experiments were concluded.

FIRST STAGE OF EXPERIMENT

The first five men listed in the table were selected for the direct blood transfer from the juvenile red spider monkeys (Nos. 3, 4 and 6) since these animals were large enough to stand the shock of aspirating blood in sufficient amount for use. The infant red spider monkey only weighed 1½ pounds and was too sick to risk as a donor of blood for the men. It was, therefore, saved to act as host for the mosquitoes. The juvenile monkeys carried a moderate but satisfactory degree of malarial infection for use in the test. These animals were given a general anesthetic (ether) on March 11, 1930, and blood was then aspirated from the heart under aseptic conditions. They recovered from the shock promptly and all of them are still living and showing occasional malarial relapses. The fresh whole blood was immediately administered to the five men without the addition of any saline or citrate solutions. Each man received 1 cc. intravenously and 0.5 cc. subcutaneously except in the case of H. J. B. whose intravenous dose was 0.5 cc. due to trouble caused by coagulation of the specimen. The men were sent to Gorgas Hospital for isolation and observation. There was no apparent reaction to the introduction of this foreign blood. We conducted thin and thick blood film examinations twice a day throughout the entire period of confinement in the hospital in addition to the routine examinations made by Gorgas Hospital.

BLACK SPIDER MONKEY CONTROL (LAB. NO. 11)

At the time these five men were given the direct blood inoculations this control monkey was also given 1 cc. of red spider monkey blood. This was an intraperitoneal and subcutaneous inoculation. The monkey (Lab. No. 11) developed positive blood films for malaria on the eleventh day, later became very ill with the disease and died of it on the forty-eighth day after the inoculation. A solution of quinine (3 grains a day) was given during the last four days of its illness with no apparent effect.

None of the five men developed any noteworthy evidence of illness although a few doubtful intracorpuscular bodies were found in an occasional blood film by some one of the four technicians who searched the daily set of blood films. At the close of two weeks the direct blood method was considered a failure and we resorted to efforts at mosquito transfer with this group as well as the second group of three men.

SECOND STAGE OF EXPERIMENT. TRANSFER EFFORTS WITH MOSQUITOES

We, of course, did not know what, if any, mosquitoes were responsible for malaria in monkeys. This work was done in the dry season when it is difficult to find mosquito larvae in sufficient abundance to support such an experiment. Since the *Anopheles* mosquitoes play an important rôle in the transfer of human malaria we used all of the available larvae of this genus to rear and feed on our monkeys. We worked with *Anopheles albimanus*, *Anopheles tarsimaculatus*, *Anopheles argyritarsis* and *Anopheles pseudopunctipennis*. These four species happen to include the most important transmitters of malaria in Panama. Darling's (2) experimental work on attempts to infect the *Anopheles* of Panama found that he could infect 70.2 per cent of *A. albimanus*, 60 per cent of *A. tarsimaculatus*, 12.9 per cent of *A. pseudopunctipennis*. He had too few of *A. argyritarsis* to form an opinion but he later found one of this species naturally infected in a house catch that he examined.

Mosquito biting on the malaria monkeys was started with a few lots on March 10, 1930 and was continued until March 25, 1930. Mosquito lots 1, 2, 3, 4, 5, 6, 7 and 8 were fed on the sick infant red spider monkey (Lab. No. 7) and this monkey's blood was richly parasitized. All forms of the parasites could be found but gametes were very abundant, ranging as high on one day as 100 to a field in a thick blood film.

Mosquito lots 9 to 20 were fed on the juvenile red spider (Lab. No. 6). This monkey's blood film contained about 1 gamete to two microscopic fields. See table 2 for mosquitoes used.

On March 19, 1930 the mosquitoes were considered ready to use on the men. These were the last three men on the list. *A. tarsimaculatus* was used on A. D. who received 25 bites from March 20 to April 1, 1930. Lots 7, 8, 10, 12, 13 and C were used. *A. pseudopunctipennis* was fed on J. H. K. who received 30 bites from March 19 to April 1, 1930. Mosquito lots 3, 5 and 11 were used. *A. albimanus* was selected to feed on C. R. G. who received 45 bites from March 19 to 26, 1930. Mosquito lots 1, 2, 4 and 6 were used and all of these were fed on the seriously ill infant monkey No. 7.

These men were observed until April 21 without findings of any consequence to record except in the case of A. D. who ran an elevation of temperature to 100.6 on April second and there-after had several elevations at or near 100°. On April 17 and May 7 he showed one or two forms that we consider to be malarial parasites but there was nothing satisfactory to report.

TABLE 2

RECORD OF MOSQUITOES USED IN BITING EXPERIMENTS ON THE TRANSMISSION OF MONKEY MALARIA

Lot Number of Mosquitoes	Number of Mosquitoes in Lot	Species of Mosquitoes	Fed on Infected Monkey Number	Date of Infective Feeding
1	17	*A. albimanus*	7	March 10*
2	9	*A. albimanus*	7	March 10–11
3	17	*A. pseudopunctipennis*	7	March 11
4	10	*A. albimanus*	7	March 12–13
5	5	*A. pseudopunctipennis*	7	March 12
6	10	*A. albimanus*	7	March 14–15
7	14	*A. tarsimaculatus*	7	March 14–15
8	7	*A. tarsimaculatus*	7	March 17
9	5	*A. albimanus*	6	March 17
10	5	*A. tarsimaculatus*	6	March 17
11	4	*A. pseudopunctipennis*	6	March 17
12	7	*A. tarsimaculatus*	6	March 19
13	12	*A. tarsimaculatus*	6	March 20
14	4	*A. argyritarsis*	6	March 20
15	19	*A. tarsimaculatus*	6	March 21
16	24	*A. tarsimaculatus*	6	March 21–22
17	8	*A. argyritarsis*	6	March 21–22
18	6	*A. pseudopunctipennis*	6	March 22
19	18	*A. tarsimaculatus*	6	March 24–25
20	14	*A. pseudopunctipennis*	6	March 24–25
21	4	*A. argyritarsis*	6	March 24–25
A	2	*A. argyritarsis*	6	March 17
B	2	*A. albimanus*	6	March 24–25
C	1	*A. tarsimaculatus*	6	March 25

* (This lot nearly all fed on Monkey 7 again on March 14.)

STAGE THREE OF THE EXPERIMENT

It was now decided to use two men from this last group for a direct inoculation subcutaneously of heavily parasitized monkey blood from the black spider monkey (Lab. No. 11). This was the control animal in the first stage of the experimental work. A. D. was permitted to continue since it was thought he might develop an attack. On April 21, 1930, J. H. K. and C. R. G. were taken to the laboratory where they each received 2 cc. of fresh whole blood from the heart of the sick black spider monkey. This was injected subcutaneously at the lower angle of the left scapula. This monkey's blood was very heavily parasitized at the time. Nothing of note occurred as a result of these injections in the men. The white face monkey (Lab. No. 9) was also injected with blood from the black spider monkey as a control. The intraperitoneal and subcutaneous methods were used. It became positive for malaria on the 11th day and passed a serious illness but now appears to have recovered spontaneously. There are times when its blood films still show a few parasites.

STAGE FOUR OF THE EXPERIMENT

The first group of five men were now subjected to mosquito biting.

A. pseudopunctipennis was used on R. F. A. who received a total of 19 bites, April 1 to 7, 1930. Mosquito lots 3, 5, 11 and 20 were used.

A. tarsimaculatus was used on A. A. R. who received 28 bites from March 30 to April 7, 1930. Mosquito lots 12, 13, 16 and C were used.

A. tarsimaculatus was also used on E. C. C. who received 28 bites from March 30 to April 7, 1930. Mosquito lots 8, 10, 15 and 19 were used.

A. albimanus was used on O. A. D. He received 21 bites from March 27 to April 7, 1930. Mosquito lots 1, 4, 6, 9 and B were used.

A. argyritarsis was used on H. J. B. and he received 15 bites from March 26 to April 7, 1930. Mosquito lots 14, 17, 21 and A were used.

Nothing resulted from these efforts to transfer the parasite.

Mosquitoes dissected three weeks after feeding on monkey malaria revealed glands positive in 2 out of 18 *A. tarsimaculatus*, 1 out of 7 *A. albimanus*. *A. pseudopunctipennis* (11) and *A. argyritarsis* (4) were negative.

The first group of five men were admitted to Gorgas Hospital March 11, 1930, and were discharged April 28, 1930. The case numbers are 313028 to 313032.

The second group of three men were admitted March 19, 1930, and discharged May 12, 1930. The case numbers are 313337 to 313339.

CONCLUSIONS

1. We conclude that red spider monkey malaria and the human benign species of malaria that it so closely resembles are not identical and that the monkey is not, therefore, a reservoir for human malaria, in view of the fact that two control monkeys of different species from the red spider monkey developed acute attacks of malaria on schedule time (eleven days) and that no symptoms and no satisfactory laboratory findings developed in eight men representing the best type of non-immune subjects.
2. It remains to be seen, however, what may happen when an infant monkey (born free of opportunities to acquire monkey malaria) is inoculated with human malaria of the benign species. We await this opportunity, but circumstances indicate it will not acquire the disease.
3. The knowledge gained by our local field and laboratory work on monkeys offers one practical feature. The infant and juvenile monkeys of certain species (*Ateles* and *Cebus*) offer a better animal for research in malaria than the bird which is customarily used.
4. It is interesting to note that two specimens of *A. tarsimaculatus* and one specimen of *A. albimanus* fed on the monkeys showed positive glands on dissection. Further work is indicated in feeding mosquitoes on monkey malaria since it may at least assist in providing teaching material.

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SECTION III

THE DIAGNOSIS OF ENDAMOEBA HISTOLYTICA*

ERNEST CARROLL FAUST, M.A., Ph.D.

Professor of Parasitology,

Tulane University Medical School,

New Orleans, La.

The early diagnosis of the pathogenic intestinal ameba, *Endamoeba histolytica*, from the time of its discovery by Loesch (1875) up to the World War, depended on the finding of the active stage of the organism (i.e. the trophozoite), either in passed stools or in autopsy section. The work of Wenyon (1915), Dobell (1919), Kofoid (1921), W. M. James (1927) and others has developed a technic for the accurate differential diagnosis of this organism, dependent primarily on a study of Schaudinn-fixed hematoxylin-stained preparations. In its simplest modifications, this technic can supply fecal films ready for diagnostic study two hours after the stool has been passed, but this procedure requires a skilled technician trained in the method and free from other duties for the period while the slides are being prepared. Boeck and Drbohlav (1925), Andrews (1925), Craig (1927), and others have developed the use of the culture method for the diagnosis of *E. histolytica*, while Craig (1928) has more recently come to rely on a complement-fixation technic for his diagnoses.

Examination of more than 40,000 specimens from more than 13,000 patients in the Peiping Union Medical College, Peiping, China, between the years 1923 and 1928 (Faust, 1929), in which *Endamoeba histolytica* occurred in 20.3 per cent of the patients, was made on a basis of fresh preparations both unstained and with the eosin-iodine method (after the technic of Donaldson), checked by the preparation of Schaudinn-fixed hematoxylin films. An analysis of these data indicated that there was a 5 per cent error in the diagnosis of the fresh specimens; that there was also a 5 per cent error in the diagnosis of the hematoxylin-stained specimens, but that these errors did not coincide. It is therefore evident that the most accurate diagnosis would require a combination of both of these methods. However, this 5 per cent error in either case is probably less than the error of the personal equation in interpreting the picture of the organism under optimum laboratory conditions.

In view of the findings in this series of cases the technic which has been adopted and utilized by the writer since 1928 has consisted in the use of Donaldson's iodine staining of fresh films, in conjunction with an examination of unstained fresh films. Up to the present time approximately 10,000 specimens have been examined by this method, utilizing the hematoxylin-stained preparations as a check only in those cases (about 5 per cent) where doubt existed as to the type of organism present in the film due to poor resolution of the preparation. This technic has consisted in the examination of as fresh fecal material as could be obtained from the patient. A drop or two of physiological salt solution has been placed on an absolutely clean fecal slide* (40 x 75 mm.) and a small representative portion of the fecal material thoroughly mixed with this diluent until a thorough commingling was obtained. An attempt is made in each case to make a smear approximately 25 mm. wide and 50 mm. long. When this smear has been sufficiently thinned to allow good resolution when examined under the microscope, a clean 22 mm. cover glass is placed so as to cover the right-hand half of the film. A small drop of Donaldson's iodine (saturated solution of iodine in 5 per cent aqueous potassium iodide) is then added to the left-hand portion and thoroughly mixed with it, after which a clean cover glass is placed on this portion of the film. The slide is then placed on the microscope stage and examined with both low and high dry objectives. After the gross material has been examined in this manner a portion of the stool is centrifuged and the concentrate examined in a similar manner. In the former film, both active and encysted forms of all of the intestinal protozoa are easily observed; in the concentrated material cysts are the more frequent, since the concentration technic will either destroy a considerable number of the trophozoites or will produce their encystment. The eosin portion of the Donaldson's technic has been omitted, since it was originally introduced to detect dead organisms and no particular advantage is obtained today by its use. In the unstained portion of the film the nuclear chromatin, and the chromatoidal bodies when present, stand out in contrast against the less refractive cytoplasm of the cell. In the iodine-stained portion the chromatin elements of the nuclei and less frequently the chromatoidal bodies stand out as unstained organelles against the iodine-stained cytoplasm. With this technic the writer has had no difficulty in differentiating the active *E. histolytica* from the more sluggish trophozoites of *E. coli*. In the encysted stages it is possible to make out 1, 2, 3 or 4 nuclei and rarely (in about 1 per cent of the cases) 5 to 8 nuclei in *Endamoeba histolytica*. When the chromatoidal bodies are present (in about 10 per cent of *E. histolytica* cysts) they have definitely rounded ends and cannot be mistaken for the splintered chromatoidals of *E. coli* cysts. The chromatin dot of the nucleus of *E. histolytica* is characteristically in the center of the nucleus, but occasionally it appears to be slightly eccentric in position. The cyst is usually although not always smaller than that of *E. coli*, usually although not always larger than that of *Endolimax nana*. It is commonly spherical, although at times somewhat oval or compressed. Its wall is more delicate than that of *E. coli*, the consistency of the cytoplasm less dense and usually less granular. On the whole it is easier to focus through the cyst of *E. histolytica* under high powers of the microscope than through those of *E. coli*, *Endolimax nana* and Iodamoeba. Occasionally there is a diffuse glycogen mass in *E. histolytica*; this is never as dense as one finds in *E. coli* and the outline is much less distinct than it is in the glycogen mass of Iodamoeba.

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* Contribution from the Parasitology Laboratory, Department of Tropical Medicine, Tulane University.

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* The least film of oil on the slide absolutely spoils the preparation, as does oil in the stool specimen placed on the slide.

In addition to differentiating the cyst of *Endamoeba histolytica* from that of *E. coli*, *E. nana* and Iodamoeba, it is necessary at times to rule out Blastocystis. This yeast cell frequently corresponds in size to that of the cyst of *E. histolytica*. In unstained preparations its resolution is poor, but in stained preparations it is easy to see that the cytoplasm is confined to the rim of the cell and that the center consists of a vacuole which is frequently filled with glycogen. Not uncommonly in the iodine-stained portion of the film these Blastocystis organisms are badly shrunken and in this way they can be distinguished from amebic cysts.

It is not the purpose of this paper to evaluate the pathogenicity or clinical importance of *E. histolytica* in those cases in which only cysts of the organism are found. It needs to be emphasized, however, that in the Orient, in the southern United States and in Panama, in which regions the writer has had considerable experience in making fecal examinations, there are large numbers of the population who are constantly passing cysts without showing any active dysentery. In this connection it may be noted that *E. coli* trophozoites are seldom observed unless the stool is of a liquid consistency. This latter condition, however, not infrequently occurs after the purgative has been administered to the patient.

The question arises as to the number of stools it is necessary to examine in order to obtain an accurate estimate of the presence or absence of *E. histolytica* in the patient's intestine. In old chronic cases, where the passed stool is more or less unformed it has been the writer's experience that it is frequently necessary to have absolutely fresh bed-pan specimens for immediate examination in order to obtain the trophozoite stage. If the specimen is even an hour old in some cases the trophozoites degenerate and no cysts are found. Frequently a proctoscopic examination is more satisfactory. In the case of "cyst passers" in more than 1300 patients in the Santo Tomas Hospital in Panama (Faust, 1931), on whom three or more examinations were made, only 15.3 per cent were positive on every examination; 65.6 per cent were positive only once during the period of examination and of these 7.6 per cent showed the organism only after the third examination. On the whole, it may be said that three examinations, made by a careful laboratory worker, who is capable of recognizing the differential characteristics of *E. histolytica*, may, with the technic which the writer has employed, with reasonable certainty determine whether the patient does or does not harbor *Endamoeba histolytica*.

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THE TREATMENT OF AMOEBIASIS WITH ANAYODIN

F. W. O'CONNOR, M.R.C.S. AND C. R. HULSE

From the Department of Medicine, Presbyterian Hospital, Columbia University

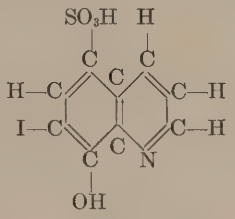
For the treatment of amoebiasis, due to infection with Entamoeba histolytica, three preparations are especially advocated at the present time. These are the double iodide of emetine and bismuth by mouth, emetine hydrochloride subcutaneously and yatren orally as well as rectally. The administration of any of these drugs has given satisfactory results in a high percentage of cases; nevertheless, a small proportion of infections prove refractory to treatment. Some patients complain that they cannot tolerate emetine while a few develop definite signs of emetine toxicity. Whereas patients will readily take yatren by mouth, some object to the rectal treatment or fail to carry it out. For these reasons it is difficult always to evaluate the effects of treatment with any of the compounds mentioned.

In 1928, while studying the effects of various drugs for the treatment of amoebiasis, the writer's attention was drawn to a preparation having the trade name, "Anayodin." The principal virtue claimed for Anayodin is that it is an efficient amoebicide. It is safe in that it causes no serious symptoms; and furthermore, from the patient's standpoint, it is in no way disagreeable to take.

The formula, as given by Ernst Bischoff, the manufacturer, is:

"ANAYODIN is Iodoxyquinolin sulphonic acid with the addition of 22% Sodium bicarbonate.

It has the empiric formula $C_9H_6INSO_4$ and the following formula



Each 4 grain ANAYODIN pill contains $3\frac{2}{10}$ grains iodoxyquinolin sulphonic acid and $\frac{8}{10}$ of a grain of sodium bicarbonate. The sodium bicarbonate is added merely to increase solubility, not for any therapeutic action.

Iodoxyquinolin sulphonic acid contains 28% of iodine, so in each pill there is .896 or practically $\frac{9}{10}$ of a grain of iodine. This iodine is so firmly fixed that no trace of free iodine can be found in ANAYODIN pills, powder or solution.

The pills are enteric coated to protect them from the gastric fluids and permit them to enter the small intestine unchanged."

In the present series fifty-one cases* have been studied and treated. Of these, six were suffering from acute amoebic dysentery at the time of examination. These patients complained of abdominal pain and the passage of numerous soft or liquid stools containing blood and mucus, in which subsequently were found actively motile free amoebae containing red blood cells. In two of these cases complaining of tenesmus, amoebic ulcers were observed in the rectum through the proctoscope. Eleven of these cases, when examined, were not suffering from the acute disease but gave histories of acute attacks similar to the above and associated with loss of weight within recent periods which varied from a few weeks to several months. In five cases there was a history of alternating attacks of diarrhea, without visible blood or mucus, and constipation, accompanied by attacks of abdominal pain and a general feeling of ill health. The remaining twenty-nine cases were persons in whose stools Entamoeba histolytica cysts were found during routine examinations in connection with some gastro-intestinal complaint in which, however, there was no definite history of amoebic dysentery or diarrhea. In two of the cases with amoebic dysentery the condition was complicated by amoebic liver abscess. In one case the amoebic condition was complicated by bacillary dysentery. In this patient's stool Flexner Y bacillus was isolated.

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*Dr. O'Connor has complete protocols of all his cases; but with present paper, at the Editor's request, only the main facts have been stated.

TREATMENT

All the cases with acute dysentery were treated in bed having first been put on liquid diet. The rest of the cases were advised to take soft diet during their treatment as out-patients.

The administration of the drug is simple. The patient takes four pills of Anayodin with meals, three times a day, making a total of twelve pills per day for eight days. Therefore, at the end of treatment the patient will have taken ninety-six pills.

In all the cases except two, drug treatment was not associated with any disagreeable symptoms. Two of the patients complained that diarrhea became more profuse. Since these two patients were being treated as out-patients they were advised to assume the recumbent position after which the diarrhea ceased.

RESULTS

In 49 of the 51 cases the patient made an uninterrupted and uneventful recovery and good health has been maintained. The stools in all these cases have been microscopically controlled for a period of over a year in most of the cases, two years in some, and never less than six months. No evidence of cysts or free forms of Entamoeba histolytica has been found since treatment in any of these cases.

One case, a lady missionary from Persia, improved considerably after treatment with Anayodin; but after two months, during routine follow-up study of the stool, Entamoeba histolytica cysts were again found. A second course of Anayodin was administered; and since then, one year ago, there have been no symptoms and no parasites have been found in the stools.

The second case, an American born soldier aged 44, was admitted to the hospital in a state of extreme collapse. Bacterial culture of the stool which consisted of blood and mucus revealed Flexner Y bacillus. On microscopic study large numbers of actively motile free Entamoebae histolytica containing red blood cells were found. Treatment with Anayodin was at once instigated. Within twenty-four hours the number of stools was reduced from twenty-four to ten and amoebae could not be found in the stools. However, the patient got rapidly weaker and died in twenty-four hours. At autopsy, the large intestine, including rectum, was found to contain large numbers of typical amoebic ulcers. No amoebae were found in the intestinal contents nor from the mucus on the surface of the ulcers; but subsequently, in microscopic sections of the bases of the ulcers, a few amoebae were found on the submucosa.

CASES COMPLICATED BY LIVER ABSCESSES

Two cases were complicated by liver abscess. In one, a Chinaman, a diagnosis of liver abscess had been made and pus was evacuated before amoebae had been found in the stool after repeated examinations. While still in bed following operation, the patient had a typical attack of amoebic dysentery and Entamoebae histolytica were found in the stool. The patient was treated with Anayodin and made an uninterrupted recovery. He has been observed at intervals for two years without any return of symptoms, while amoebae have not again been found in the stools.

A second case, an Italian woman, resident for thirty-five years in New York City, was admitted to the hospital with signs of liver abscess. Examination of the stool revealed pre-cystic and cystic forms of Entamoeba histolytica. An open operation was performed and pus was evacuated from the liver. In the exudate from the walls of the abscess cavity motile Entamoebae histolytica were found in large numbers. Treatment with Anayodin was then given and parasites rapidly disappeared from the stool. A few weeks later the patient developed signs of sub-phrenic abscess and at a second operation a large quantity of pus was evacuated and in the exudate from the walls of this abscess, motile amoebae containing red blood cells were also found. The abscess cavity was washed out with a 1% solution of emetine hydrochloride and the sinuses from both operations healed without further trouble. For more than a year this patient has remained free from symptoms and no parasites have been found on microscopical examination of the stools.

SUMMARY

1. Fifty-one cases of amoebiasis have been treated with Anayodin.
2. One case complicated by bacillary dysentery (Flexner Y type), admitted to the hospital in a prostrate condition, died.
3. One case following treatment with Anayodin relapsed. Following a second treatment with the same drug, she completely recovered.
4. Forty-nine cases treated with Anayodin remained free from symptoms and during a control period varying from six months as a minimum to two years no amoebae, free or encysted, have been found in the stools.
5. Amoebic abscess of the liver does not seem to be affected by Anayodin given orally which appears to exercise a direct action on the parasites in the intestinal tract only.
6. The present experience suggests that Anayodin is an effective amoebicide in cases of intestinal amoebiasis.
7. The administration of the drug is attended by no unpleasant symptoms as a rule.

TREATMENT OF AMOEBIASIS WITH PREPARATIONS OF IODO-OXY-QUINOLIN SULPHONIC ACID

ERNST THONNARD-NEUMANN, M.D. and FRANCISCO VALERA, M.D.
United Fruit Company Hospital
Santa Marta, Colombia

The efficacy of the treatment of acute amoebic dysentery with emetine injections and large oral doses of bismuth subnitrate which was recommended and adopted in 1913 by Deeks is, in our opinion, still unsurpassed by any other therapeutic measures.

In this Division the incidence of amoebic infection of the bowels has always been high, and stool examinations still very often reveal the presence of Endamoeba histolytica. Under such circumstances, one would expect acute amoebic dysentery to be of frequent occurrence; but this is no longer true.

Whereas in 1925, 42 per thousand employees were treated in this hospital for amoebic dysentery, this rate decreased during the next five years to nine per thousand. In 1929, the last year of this period, only two cases, (one an employee) were admitted for amoebic abscess of the liver. We believe this change to be due mostly to the improvement of drinking water thru the medium of wells installed throughout the Division.

Among foreign employees, amoebic dysentery has become extremely rare, and the cases we observed during the last eighteen months showed only a small per centage with acute dysenteric symptoms. Often they presented the clinical picture of an acute gastro-enteritis, with fever, vomiting, gastric distress, and diarrhea of short duration frequently followed in from 24 to 48 hours by a period of constipation. More often, no history of dysentery could be obtained in these cases; and generally flatulence, tenesmus and constipation lead them to seek medical advice. In the macroscopical stool inspection of such cases, typical amoebic dysentery stools were absent in the majority. Stools which contained a fair number of vegetative forms of Endamoeba histolytica, were often well-formed and showed no blood though a small amount of mucus was usually present. In cases of a rather recent infection, or those due to intestinal irritation from a purge or to dietetic indiscretions the microscopic examination would reveal the presence of pus, blood and mucus in addition to amoebae. The symptoms just described are more or less characteristic of the majority of primary bowel infections with amoebae, among foreign employees; and this statement also applies, to a certain degree, to the native population.

The variation in their symptomatology can be attributed to several possible factors; and, of these, the following seem to us to be the most important:

(1) A longer duration of the infection, due either to negligence or to the disconcerting or misleading character of the symptoms.

(2) Frequent reinfections.

(3) A change of diet, which is usually unbalanced.

(4) Associated bowel diseases of other parasitic origin.

(5) The frequency of accompanying diseases of other organs, (visceral syphilis, malaria, etc.)

(6) The improper use of cathartics.

Infants and older babies are the exception; and, with them, primary infections usually present a clinical picture of acute dysentery.

It is beyond the scope of this paper to describe the protean character of the symptoms of amoebic infections which are presented to us every day by our native patients. There is, however, one objective symptom which we have found of value in the physical examination of obscure cases of chronic amoebic infection of the bowels. So far as we know, it was first described extensively in the literature by A. de Silva-Mello (Rio de Janeiro) Archiv fuer Schiffs und Tropenhygiene, Band 34, 1930, Heft 8, who calls it the "Sign of the Left Hypogastrium," and, in describing it, says: "which consists of a more or less intense and diffuse tenderness on palpating the abdomen in this region along the sigmoid and lower part of ascending colon."

The most frequent complaints elicited from our patients are chronic constipation with its sequelae, occasionally interrupted for a short period by diarrhea of a moderate degree. We believe that this chronic constipation may not be due as frequently to a direct effect of Endamoeba histolytica upon the intestinal wall as to an alteration of the normal flora of the large bowel following infestation with this parasite which, more than likely, acts as a strong contributary factor in the production of this condition. While we admit that other causes, unrelated to the presence of this protozoon, no doubt operate; we believe that the effect of the treatment outlined in this report justifies our opinion that, in the great majority of the patients who harbored amoebae, this symptom was due to their presence.

Upon the request of Dr. Deeks we have, during 1930, treated a series of cases of amoebiasis with Anayodin, which is chemically described as an Iodo-oxy-quinolin sulphonic acid with an iodine content of about 28%. We selected for treatment those cases in whom the presence of Endamoeba histolytica in the faeces was associated with objective and subjective intestinal manifestations. The therapy was exclusively oral. Adults were given four pills of four grains each three times daily until the stools became amoeba-free, but in any event for not less than three successive days. When circumstances permitted, this treatment was continued for a few more days after the stools had become negative. Later, after an interval of a few days, the treatment was repeated. As daily stool examinations were performed, we were able to determine the period of treatment required in each case before it responded to the drug.

The previous experience of one of us with Yatren 105 (a composition of Iodo-oxy-quinolin sulphonic acid and 0.2% Diiodo-oxy-quinolin with an iodine content of 36.2%, which, during the past ten years, has been extensively used for the

CHART NO. I
ANAYODIN SERIES

Case No.	Age	Sex	Diagnosis	Stool Examination for E. histolytica before treatment	Dosage	Stool Examinations after 1 to 10 Days of Treatment										Observation
						1	2	3	4	5	6	7	8	9	10	
1	32	Male	Amoebiasis	++	4 pills t.i.d. for 4 days	+	—	—	—	0	0	0	0	0	0	
2	23	Male	Acute amoebic dysentery	++	4 pills t.i.d. for 5 days	++	—	—	—	—	0	0	0	0	0	
3	24	Male	Acute amoebic dysentery	+	4 pills t.i.d. for 4 days	—	—	—	—	0	0	0	0	0	0	
4	18	Male	Amoebiasis	++	4 pills t.i.d. for 5 days	0	—	—	—	—	0	0	0	0	0	
5	36	Male	Amoebiasis	+	4 pills t.i.d. for 1 day 2 pills t.i.d. for 7 days	0	0	0	0	0	0	0	—	—	—	As the patient was transferred to the surgical ward immediately after the initial stool examinations, no stool examinations were made during the first seven days of treatment.
6	34	Male	Chronic amoebic dysentery	+	4 pills t.i.d. for 9 days	0	—	—	—	0	++*	—	—	—	0	
7	26	Male	Amoebiasis	+++	4 pills t.i.d. for 4 days	0	—	—	—	—	0	0	0	0	0	
8	23	Male	Amoebiasis	++	4 pills t.i.d. for 9 days	0	0	+	—	+	—	—	—	—	0	
9	35	Male	Amoebiasis	+	4 pills t.i.d. for 4 days	+	+	+	—	—	0	0	0	0	0	
10	22	Male	Acute dysentery	+	4 pills t.i.d. for 4 days	0	—	—	—	0	0	0	0	0	0	
11	18	Male	Amoebiasis	++*	4 pills t.i.d. for 3 days	—	—	—	0	0	0	0	0	0	0	
12	28	Male	Amoebiasis	+*	4 pills t.i.d. for 7 days	+*	0	+*	0	+*	—	—	0	0	0	
13	33	Male	Acute amoebic dysentery	++	4 pills t.i.d. for 6 days	+	—	—	—	—	—	0	0	0	0	

14	22	Male	Chronic amoebic dysentery	Neg.	4 pills t.i.d. for 8 days	—	—	+*	0	—	—	—	—	0	0	After chenopodium treatment cysts appeared in stool on the third day after the beginning of the Anayodin treatment.
15	22	Male	Chronic dysentery	++	4 pills t.i.d. for 5 days	—	+++	—	—	—	0	0	0	0	0	
16	Adult	Female	Chronic amoebic dysentery	++	2 pills t.i.d. for 6 days	—	—	—	—	—	—	0	0	0	0	
17	Adult	Female	Amoebiasis	+	3 pills t.i.d. for 3 days	—	—	—	0	0	0	0	0	0	0	
18	Adult	Female	Acute dysentery	++	3 pills t.i.d. for 3 days	++	—	—	0	0	0	0	0	0	0	
19	Adult	Female	Chronic dysentery	++	2 pills t.i.d. for 5 days (Interval of 8 days) 3 pills t.i.d. for 5 days	—	—	—	—	(See Observations)						After the 8-day interval, the stool was positive (++) again. Four days after increasing the dosage, the stools were negative and remained negative for 8 more days.
20	Adult	Female	Amoebiasis	++*	3 pills t.i.d. for 4 days	—	—	—	0	0	0	0	0	0	0	
21	Adult	Female	Acute dysentery	+	3 pills t.i.d. for 5 days	—	—	0	0	0	—	0	0	0	—	
22	2	Male	Acute amoebic dysentery	++	1 pill b.i.d. for 10 days	—	—	—	0	0	0	—	—	—	—	After 8 days interval the patient relapsed; and was then cured after 5 days treatment with Yatren (1 pill, b.i.d.). The stools were not examined daily during the second course of treatment, but only at the end of it.
23	Adult	Female	Chronic amoebic dysentery	++	3 pills t.i.d. for 5 days	++	+	—	—	0	0	0	0	0	0	After 4 days cessation of treatment, the stools were negative.
24	4	Male	Amoebiasis	++	1 pill t.i.d. for 7 days	+	—	—	0	—	—	—	—	—	—	
25	Adult	Female	Amoebiasis	+	2 pills t.i.d. for 7 days	+	—	—	—	—	—	—	0	0	0	

* Cysts.
— = Negative for amoeba.
0 = No stool examination.

CHART NO. II
YATREN SERIES

Case No.	Age	Sex	Diagnosis	Stool Examination for E. histolytica before Treatment	Dosage	Stool Examinations after 1 to 10 Days of Treatment										Observation
						1	2	3	4	5	6	7	8	9	10	
1	22	Male	Chronic amoebic dysentery	++	1 pill t.i.d. for 1 day 2 pills t.i.d. for 3 days 3 pills t.i.d. for 4 days	+	—	+	+	—	—	0	0	0	0	Patient had received 10 grs. of emetine before Yatren treatment.
2	40	Male	Amoebiasis	++	2 pills t.i.d. for 2 days 1 pill t.i.d. for 1 day	+	+	+	—	—	—	0	0	0	0	Patient had received 6 grs. of emetine before Yatren treatment.
3	21	Male	Acute amoebic dysentery	+	2 pills t.i.d. for 2 days 3 pills t.i.d. for 5 days	+	+	—	—	—	0	0	0	0	0	
4	20	Male	Amoebiasis	+	2 pills t.i.d. for 1 day 3 pills t.i.d. for 3 days	—	—	—	0	0	0	0	0	0	0	
5	29	Male	Amoebiasis	++	2 pills t.i.d. for 1 day 3 pills t.i.d. for 5 days	+	+	+	+	—	—	0	0	0	0	On the 11th day after the beginning of treatment, and following an interval of 5 days without treatment, stools were negative.
6	38	Male	Amoebiasis	++	2 pills t.i.d. for 5 days	+	+	+	—	—	—	—	—	—	—	After 8 days pause, stools were negative. Treatment was repeated with 2 pills t.i.d. for 5 days more.
7	34	Male	Amoebiasis	++	2 pills t.i.d. for 1 day 3 pills t.i.d. for 6 days	+	+	+*	—	—	—	0	0	0	0	
8	39	Male	Amoebiasis	++	2 pills t.i.d. for 3 days 3 pills t.i.d. for 4 days	—	—	—	—	—	—	—	—	—	—	After 8 days interval, stools were negative.
9	30	Male	Amoebiasis and amoebic hepatitis	++	2 pills t.i.d. for 3 days 3 pills t.i.d. for 7 days	+*	—	—	—	—	—	—	—	—	—	

10	33	Male	Acute amoebic hepatitis (abscess?)	+	2 pills t.i.d. for 6 days 4 pills t.i.d. for 6 days	++	++	+	–	–	–	–	–	–	–	Temperature dropped to normal after 5 days, but liver was still enlarged and tender. Patient received 6 grs. of emetine.
11	27	Male	Amoebiasis	++	2 pills t.i.d. for 1 day 3 pills t.i.d. for 5 days	+	+	–	–	–	–	0	0	0	0	
12	32	Male	Amoebiasis	+	2 pills t.i.d. for 4 days	+	–	–	–	–	0	0	0	0	0	
13	43	Male	Amoebiasis	+	2 pills t.i.d. for 7 days	+*	+++*	+*	–	–	–	–	0	0	0	
14	28	Male	Amoebiasis	+	2 pills t.i.d. for 5 days 4 pills t.i.d. for 5 days	+	+	–	–	–	–	0	0	0	0	Dose was increased because the patient, while taking 2 pills t.i.d., was constipated.
15	26	Male	Acute amoebic dysentery	+	2 pills t.i.d. for 7 days	++*	+*	–	–	–	0	0	0	0	0	
16	32	Male	Amoebiasis, chronic amoebic hepatitis	+++	2 pills t.i.d. for 3 days 3 pills t.i.d. for 3 days 4 pills t.i.d. for 3 days	+	–	+*	++	+++	++*	–	–	–	–	Observations were carried on for 16 days. The patient received 6 emetine injections of 1 gr. each.
17	40	Male	Acute amoebic dysentery	++	2 pills t.i.d. for 10 days 3 pills t.i.d. for 4 days 2 pills t.i.d. for 6 days	+	–	–	–	–	–	–	–	–	0	
18	40	Male	Amoebiasis	++	2 pills t.i.d. for 6 days	+	–	–	–	–	–	–	0	0	0	
19	28	Male	Amoebiasis	+	2 pills t.i.d. for 10 days	+*	–	–	–	–	–	–	–	0	0	
20	7	Male	Amoebiasis	+++	2 pills t.i.d. for 20 days 3 pills t.i.d. for 6 days	++	++	+	–	–	–	–	–	0	0	
21	35	Male	Amoebiasis	++	2 pills t.i.d. for 2 days 3 pills t.i.d. for 5 days	++	+	–	–	–	–	–	–	0	0	
22	27	Male	Amoebiasis	+	2 pills t.i.d. for 1 day 3 pills t.i.d. for 6 days	++	++	–	–	–	–	–	0	0	0	
23	22	Male	Amoebiasis	++	2 pills t.i.d. for 1 day 3 pills t.i.d. for 6 days	+	–	–	–	–	–	–	0	0	0	

CHART NO. II—*Concluded*

Case No.	Age	Sex	Diagnosis	Stool Examination for E. histolytica before Treatment	Dosage	Stool Examinations after 1 to 10 Days of Treatment										Observation
						1	2	3	4	5	6	7	8	9	10	
24	30	Male	Amoebiasis	+	2 pills t.i.d. for 1 day 3 pills t.i.d. for 4 days	+	—	—	—	—	—	0	0	0	0	
25	35	Male	Acute amoebic dysentery	+++	2 pills t.i.d. for 7 days	—	—	—	—	—	—	—	0	0	0	
26	30	Male	Chronic amoebic dysentery	+	2 pills t.i.d. for 5 days	++	+	—	—	—	—	0	0	0	0	
27	25	Male	Amoebiasis	+	2 pills t.i.d. for 1 day 3 pills t.i.d. for 4 days	—	—	—	—	—	0	0	0	0	0	
28	23	Male	Amoebiasis	++	2 pills t.i.d. for 4 days 3 pills t.i.d. for 2 days	+++	+	+	+++	++	—	—	—	0	0	
29	25	Male	Chronic amoebic dysentery	++	2 pills t.i.d. for 1 day 3 pills t.i.d. for 5 days	++	—	—	—	—	—	—	0	0	0	
30	25	Male	Chronic amoebic dysentery	++	3 pills t.i.d. for 7 days 4 pills t.i.d. for 4 days	++	—	+++	—	—	+++	+	+	—	—	

NOTE: Cases 1 and 2 received emetine treatment before Yatren was administered; but the stools did not become negative nor were the clinical results satisfactory. The cases were included in this series as we considered that the gratifying results which we obtained finally were due exclusively to the Yatren and not to the preceding emetine treatment.

Case 10, after the stools had become free from amoebae, received emetine injections for the liver condition which did not seem to have improved under Yatren treatment alone. The patient received injections of one grain of emetine daily on the 10th to the 15th day after the beginning of the Yatren treatment.

Case 16.—Daily stool examinations were carried on for sixteen consecutive days. The stools became negative under Yatren treatment alone on the 7th day, and remained so during the whole course of treatment. The patient received injections of one grain of emetine daily, on the 11th to the 16th days, for his liver condition, which did not seem to have improved under Yatren treatment alone.

* Cysts.

— = Negative for amoeba.

0 = No stool examination.

treatment of amoebic infection of the bowels), lead us to treat a second series of patients with that drug, for comparative studies. As will be seen in Chart II, the daily Yatren doses, upon the advice of the manufacturers, were generally kept below the former standard dose of 16 grains daily.

In the Anayodin group, the average duration of treatment until a negative stool was obtained was two and one half days. Two relapses were observed—one became negative after only two days of Yatren treatment; and the other became negative after increasing the Anayodin dosage. Both were still negative two weeks after the termination of the second course of treatment.

In the Yatren group, the patients were treated over an average period of $3\frac{1}{4}$ days before a negative stool resulted. In spite of a prolonged observation of a number of cases which had to remain in the hospital for other reasons, no relapses were observed in this series.

Cysts made their appearance under treatment two times (8%) in the Anayodin group, and five times (17%) in the Yatren group. At the end of the treatment, all 55 cases were free from cysts. 20% of the cases were considered mild forms of acute amoebic dysentery, though they may have been acute exacerbations of a chronic amoebic infection. The parasitological and clinical response in these 11 cases was equally good in both groups.

If we compare the two groups from the standpoint of results obtained, the different dosage used in each would first have to be considered. The 8 adult female patients of the Anayodin group were all under-weight; and, based on body weight, their dosage, as well as that of the children, was equivalent to that of the male group. Each of the 25 Anayodin patients, on the average, required 30 pills or 120 grains in order to become amoeba-free.

In the Yatren group, the 30 males took altogether 669 Yatren pills of 4 grains each before the stools became negative, which is an average of about 22 pills, or 88 grains, for each patient.

Both Yatren and Anayodin produced, in the majority of our cases, frequent soft or liquid evacuations of a greenish color; which, in some instances, were accompanied by colicky pains. Such complaints were more pronounced among the patients with acute symptoms. As a rule, small doses (1 to 2 drams) of paregoric produced sufficient amelioration of symptoms to warrant continuance of the treatment without interruption.

We compared the resistance of the two drugs against deterioration by placing them separately in transparent glass-stoppered bottles in a reasonably dark and dry drug store. Of the two samples we stored on June 3rd, 1930, the Anayodin pills showed some outward signs of deterioration on November 8th, 1930. They became soft and clumped together. The Yatren pills were unaltered in appearance. The same procedure was repeated on November 8th with the extra precaution of immersing the stoppers in paraffin and using two new bottles. On March 3rd, 1931, the Yatren pills were unchanged while the Anayodin were slightly softened. (Owing to the rainy season the atmospheric humidity between June and November was higher than between November and March).

SUMMARY

In summarizing our experience with the two drugs, the following can be said. In cases of chronic amoebiasis and chronic amoebic dysentery, preparations of Iodo-oxy-quinolin sulphonic acid (Yatren 105 and Anayodin) seem to possess some advantage over other forms of treatment. The prompt disappearance of the vegetative, precystic and cystic forms of Endamoeba histolytica is soon followed by a relief of the gastrointestinal symptoms. If blood, pus and mucus were present, they quickly disappeared from the stools, and tenesmus and colic subsided rapidly. Diarrhoeic stools soon became soft, and later, firm.

A considerable number of the patients who had been suffering previously from constipation emphasized the fact that, even after treatment had been stopped, normal regular evacuations continued.

The cathartic effect is no contra-indication in cases who do not suffer already from severe diarrhoea; and too frequent bowel movements can be avoided by starting with small doses (3–6 pills daily) for the first few days.

No toxic symptoms were seen even after prolonged use of the drug.

With very few exceptions, one need not exceed the daily dose of 9 pills. If the general condition of the patient permits, he can follow this treatment without interruption of work. No severe restriction in diet, other than eggs, is necessary during the treatment of chronic cases. For routine treatment we have adopted the following method:

After a presumptive clinical diagnosis of amoebiasis or chronic amoebic dysentery has been made, a (saline) cathartic is given at bedtime which serves simultaneously as a provocative for the stool examination which follows the next morning. When the diagnosis is established, one or two pills three times daily, depending on the condition of the patient, are given. This dose is increased the following day to two or three pills three times daily; and this dosage is continued for five days. Then a second stool examination is performed and, if no amoebae are found, a second treatment of two pills three times daily is carried out for a period of five more days preceded by an interval of 3 days rest. If the second stool examination still shows amoebae, three pills three times daily are given over the same period.

We do not claim that, by this treatment, a cure will be effected in every one of our amoebiasis patients, as relapses have been known to occur weeks and even months after apparently successful treatments with any of the various other forms of therapy. Furthermore, there are many factors, over which we have little or no control, which tend to produce reinfections—especially among the labor elements. In spite of these facts, we advocate the treatment with Iodo-oxy-quinolin sulphonic acid in cases of amoebiasis; because it has proved to be safe and to free patients of their infection in a short time without much personal discomfort or loss of working days.

INCREASE OF AMOEBIASIS DURING THE RAINY SEASON IN PUERTO CORTEZ, HONDURAS

K. C. BREWSTER, B.Sc., Technician,

Cortez Development Company Hospital

Puerto Cortez, Honduras

Endemic amoebiasis needs no introduction to tropical workers. The Consolidated Laboratory report of the United Fruit Company gives the following figures for positive findings on E. histolytica in all divisions for the year 1929:

Division	Stools Examined from Hospital & Clinic	Number Positive for E. histolytica	% Positive
Banes	2215	22	0.99%
Chiriqui	952	4	0.42%
Colombia	2306	943	40.89%
Costa Rica	4283	184	4.29%
Guatemala	3976	70	1.79%
Jamaica	66	—	—
Panama	2273	14	0.62%
Preston	534	10	1.87%
Tela	5645	270	4.79%
Truxillo	4173	47	1.12%

In the above figures the question arises as to whether or not routine stools are examined for amoeba. To my personal knowledge, this was done very thoroughly on every stool specimen in the laboratory of the Colombia Division which shows 40.89% of all stools positive.

SANITARY CONDITIONS OF PUERTO CORTEZ

Water Supply.—The water for the town is supplied by a dam and pipe line from the Medina River. This supply is inadequate; and is supplemented, for the use of the United Fruit Company, by water from a deep well which is brackish. Rain water is collected from the roofs of the houses and stored in metal tanks.

Sewage System. There is no general sewage system for the town. All first-class Company houses are supplied with plumbing, the discharge from which is emptied into the ocean. The camps and houses which are farther away from the beach are provided with cesspools, primitive outhouses or the privacy of the "bush."

Soil. The soil is sandy, and has an elevation above sea level of from 2 to 6 feet.

While marked improvements are being made in general cleanliness, the sanitary conditions are very primitive. Filling of low spots is constantly going on; but, during the rainy season, the whole town is flooded.

Fruits and vegetables are sold from wheelbarrows or from piles on the ground. The milk supply is above the average; and no infection has been traced to it.

Boiling of drinking water is the exception rather than the rule, even among educated people.

Buzzards are very abundant. Their favorite resting places are the ridge poles of houses and the trees overhanging streams. The majority of the Fruit Company houses are protected against buzzards by a simple device which consists of three or four strands of barbed wire twisted together and placed about six inches above the ridge pole of the house. This is inexpensive and 100% effective in preventing excrement of buzzards being washed into the rain-water tanks.

GENERAL COMMENTS

During the month of September, which may be considered the end of the dry season, 25% of all stools examined in the laboratory showed E. histolytica. The following table shows the increase of the infection and the amount of rainfall per month.

Month	Rainfall (Inches)	Stools Examined	Number Positive	% Positive
September	5.26	156	40	25.64%
October.	22.12	205	60	29.29%
November	17.18	258	173	67.05%
December	14.23	203	141	69.45%
January	21.18	160	69	43.12%
To Feb. 15	No figures but greatly reduced	54	13	24.07%

The increasing number of infections during the month of November led us to try, by every possible means, to ascertain some special source of infection.

Tank waters from houses unprotected by buzzard guards were examined, and typical E. histolytica were found. Tank waters from houses protected by buzzard guards showed only an occasional E. Radiosa or other water amoeba. A buzzard was autopsied and typical ulceration of the gut was found, with hundreds of amoebae which could not be differentiated from E. histolytica. It is believed that, during the cool, cloudy weather of the rainy season, the encysted forms of histolytica can survive desiccation long enough to be washed into the rain water tanks by the succeeding shower. Fresh water from the Medina river was also examined, and active amoebae were found. The pathogenicity of these amoebae, however, could not be proven.

In pursuance of the *hand-to-mouth* theory of amoebic infection, various cooks and waiters were examined and practically all were found to be carriers. All of these who were in the employ of the Company were treated. Boiled water for drinking purposes, which has been the exception rather than the rule, was strongly advocated.

Clinically, the infections were characterized by rather mild symptoms. The patient usually suffered sufficient intestinal symptoms to bring a stool of his own accord, when coming to the clinic for examination. All cases with positive stools, regardless of the presence or lack of symptoms of dysentery, were treated during the peak of the infection. About 25% of these cases showed typical dysenteric stools.

During the latter half of December, the percentage of infection began to diminish; and, by the middle of February, the rate as determined by routine stool examinations was practically where it was in September. The decline of the infection has probably been greatly influenced by the intensive treatment which was given during November.

Method of Diagnosis. No report on amoebic infection is complete without a note as to the method used in diagnosis. The following methods, which the writer believes to be adequate and in accordance with the methods used by authorities, were used: *A portion of the faeces, if not sufficiently liquid, was emulsified in normal saline and a specimen prepared for examination with the "high dry" lens (450x). The motility of all active forms was carefully observed. Encysted forms were checked with weak iodine solution. In case of doubt, Giemsa fixation and staining of moist films was used. All water amoebae and buzzard amoebae were examined in both fresh and stained specimens.*

SUMMARY

1. A community of approximately 6,000 people show a rate of infection of 25%, in hospital and dispensary cases, at the end of the dry season.
2. Only in rare instances is the drinking water boiled. Native raw vegetables and raw milk are consumed.
3. General sanitary conditions are very primitive.
4. Rainfall increased from 5.26 inches per month (in September) to an average of 18.67 inches during the months of October to January, inclusive.
5. The rate of amoebic infection increased with the increase in rainfall, reaching a peak of 69.45% of all specimens examined during the month of December; and dropped to the dry season rate during the first half of the month of February.

CONCLUSION

The record of amoebiasis over one rainy season is not conclusive; but there seemed to be a very close relation between increased rainfall and increased amoebic infection in a community in which amoebiasis is endemic.

AMEBIC DYSENTERY WITH LIVER ABSCESS—CASE REPORTS

(Treatment of Abscess by Aspiration)

L. R. Fletcher, M.D.
Truxillo Railroad Company Hospital
Puerto Castilla, Honduras

Although amebic dysentery is encountered quite frequently in the hospitals of the United Fruit Company, the well-known complication of liver abscess has been relatively rare within recent years. The treatment of the two cases reported below is stressed, because of its simplicity and the good results obtained.

Case No. 1

History.—M. M., male, native of Honduras, aged 58 years, entered the hospital because of severe pain in the entire abdomen, bloody diarrhea, and a "growing mass" in right upper part of the abdomen for 3 months. The patient had been taking several patent medicines but received no relief. He often had 15 to 20 bowel movements per day.

Examination and Treatment.—Poorly nourished, anemic, unclean; and had extensive dental caries. The heart sounds were rather weak. The lungs were negative. In the epigastrium, just to the right of the mid line, was a definite, firm lump, which was rather fixed, and quite tender to pressure. The liver was enlarged; the lower border was palpated two fingers below the right costal margin, and the abnormal mass seemed to be part of the liver. The entire abdomen was quite tender. The spleen was enlarged and extended 3 inches below the umbilicus. Laboratory examination of stools revealed much blood, pus and mucus, and Entamoeba histolytica. The blood was negative for malaria, and the Meinicke turbidity reaction was negative. The white blood count was 13,000. A diagnosis of liver abscess was made; and a large trocar was introduced into the abdominal mass, and 600 c.c. of thick chocolate-colored pus was aspirated. One grain of emetine hydrochloride was given hypodermically once a day, and one teaspoonful bismuth subnitrate was administered four times a day by mouth. The condition of the patient began to improve immediately after the aspiration of the abscess. The temperature dropping from 100 degrees F. (it was never higher) to normal. The patient was discharged 2 weeks later, entirely free of all symptoms. The stools were negative for amebae, one week after the treatment was started.

Case No. 2

History.—V. T., male, Jamaican, aged 26 years, entered the hospital because of a severe pain and swelling in the upper abdomen for 5 days. He had also been having fever and vomiting spells, with attacks of diarrhea, from time to time. The patient related that 2 years ago he had had a very severe, bloody dysentery which lasted for several weeks; and stated that he doubted if he had been entirely cured at that time because of the recurrent diarrheas since.

Physical Examination and Treatment.—Poorly nourished, anemic, and slightly jaundiced male negro who appeared to be quite sick. The teeth were carious; the tongue was coated; the heart and lungs were negative; the spleen was palpated 2 fingers below the costal margin, and was tender. There was a palpable mass, 3½ inches in diameter, in the epigastrium. The liver border was palpable 1½ inches below the costal margin. Repeated laboratory examinations of stools were negative for Entamoeba histolytica, although much blood, pus and mucus was always found. The blood was positive for E. A. malaria; the Meinicke turbidity reaction was negative; the white blood count was 25,000 per cmm. Pus and a few granular casts were found in the urine.

A diagnosis of liver abscess was made; and a large trocar was introduced into the epigastric swelling, and 500 c.c. of thick semi-chocolate-colored pus was removed by aspiration. On the following day, 150 c.c. of similar pus was aspirated. There was a slight drainage of bile-colored pus from the trocar wound for 5 days after the aspiration. One grain of emetine hydrochloride hypodermically was given every day and one teaspoonful of bismuth subnitrate four times a day, with a saline cathartic every few days. The temperature, which had been ranging from 102 to 103.6 degrees F. before the operation, dropped to normal after the aspiration; appetite returned; and the patient improved rapidly, and was discharged as cured after being in the hospital 3 weeks.

THE CLINICAL IMPORTANCE OF HOOKWORM INFESTATION AMONG THE POPULATION OF THE PRESTON DIVISION, ORIENTE, CUBA

Wilhelm Cordes, M.D.

United Fruit Company Hospital

Preston, Cuba

Hookworm disease is a relative term. Not only do the two varieties, *Ankylostomum duodenale* and *Necator americanus*, differ in their intoxicating effect upon the human carrier; but, also, the absolute number of parasites present in the gastro-intestinal tract is of utmost importance. Furthermore, since hookworm infestation is most prevalent among the poor, it is often associated with other debilitating diseases and malnutrition.

When the rôle of the parasite as an anemia-producing agent was rightly apprehended, some 50 years ago, many evils were laid at its door. *Ashford*, *King* and

Gutierrez considered that 30% of the deaths in Porto Rico were caused by ankylostomiasis; and, insinuated that it is very often not diagnosed, being disguised in death certificates as anemia, general dropsy and malarial cachexia. Undoubtedly, in some parts of the tropics ankylostomiasis amounts to a real scourge; and is worthy of primary attention in medical and hygienic service. On the other hand, there are warm countries with more advanced sanitary conditions in which hookworm, although widely spread, is only of relative importance. Many persons may harbor the parasite, without suffering from it and without endangering their neighbors.

Quantitative laboratory tests have helped greatly to put hookworm infestation as a disease or simple parasitism in its proper place. The methods of *Clayton Lane* and of *Stoll* allow an estimate of the number of hookworm eggs present in the feces and, by calculation, of worms in the gastro-intestinal tract. *Smillie*, in Brazil, concluded that on the average 75 worms might be considered as the degree of infestation necessary to produce measurable symptoms; and *Smillie* and *Augustine* in Alabama found extremely little effect in a group of people harboring between 25 and 100 worms. In the opinion of *Chandler*, even persons with 2000 to 5000 eggs per gram of stool (corresponding roughly to 80–200 necators) do not necessarily suffer from their infection unless they are undernourished, over worked, or debilitated by chronic illness.

Manson-Bahr sums up the situation poignantly: *"Many inhabitants of tropical and subtropical countries are in a state of chronic starvation. Living on coarse, bulky, unnutritious food, they are prone to dilatation of the stomach and dyspeptic troubles. In such, any additional cause of malnutrition, as a swarm of ankylostomes, and a daily though perhaps small loss of blood, may be sufficient to turn the scale against them. In those countries, as elsewhere, there are many who live just on the borderland between health and disease; to such the ankylostome may prove 'the last straw that breaks the camel's back.'"* Also, *Schapiro* reaches the conclusion that faulty nutrition is the anemia-controlling factor among the hookworm-infested Indians of Panama.

During the years 1928–1930, a systematic examination was made of all hook worm carriers who came to this hospital. Of about 4000 patients, 238 showed hookworm eggs in their feces. The species encountered here is *Necator americanus*, to the exclusion of *Ankylostomum duodenale*. It is evident that infestation in this region of Cuba is rather low, because of the comparatively high living standard and sanitary housing of the laborers. All the new villages are built with sufficient privy accommodation; and soil pollution occurs only in the vicinity of the old-fashioned "barracons," which, however, become more and more deserted since the labor force is stabilized and no more seasonal cane-cutters are imported.

Hemoglobin estimations of the said 238 patients were made with an improved *Sahli* hemoglobinometer (which has a solid stained-glass rod for comparison with the hemoglobin suspension). Hookworm eggs were found by direct or flotation method, and their number was determined by *Stoll* count.* Cases were classified according to the grade of infestation and divided into 5 groups. Group I showed very few eggs, below the practical limit of the Stoll method. The following table gives the number of cases in each group and the correlation between egg count and hemoglobin content.

	Number of Eggs per cc. of Formed Stool						
Hemoglobin Content	Group 1 Less than 100	Group 2 100 to 500	Group 3 600 to 2000	Group 4 2100 to 10000	Group 5 More than 10000	Total Number of Cases	%
100% and more	—	3	2	—	—	5	2.1
90–100	6	34	21	1	—	62	26.1
80–90	16	51	37	8	—	112	47.1
70–80	2	6	17	10	1	36	15.1
60–70	—	7	2	2	1	12	5.0
50–60	—	3	2	—	—	5	2.1
40–50	—	—	1	—	1	2	0.8
30–40	—	1	—	—	1	2	0.8
20–30	—	—	—	—	2	2	0.8
Total number of cases	24	105	82	21	6	238	99.9
Average hemoglobin content	87.6	85.1	84.1	77.5	44.0		
Average egg count .	?	190	1123	4019	19550		

It appears that the great majority of patients of groups 1, 2 and 3, with up to 2000 eggs in 1 gram of feces, did not show an appreciable lowering of hemoglobin (80 to 90% is considered normal among the population of this region). 41 cases of these groups had a hemoglobin content of less than 80%, but in 35 of them there was evidence of other anemia-producing causes, namely:

Acute and subacute malaria	8	cases
Typhoid fever	2	"
Bleeding uterine fibroma.	1	"
Cirrhosis of liver	1	"
Chronic nephritis	4	"
Chronic osteomyelitis	1	"
Tertiary syphilis or framboesia	8	"
Malnutrition (unbalanced diet)	10	"

Patients of group 4, with 2000 to 10000 eggs (corresponding roughly to 80–400 necators), showed a slight reduction of hemoglobin and probably suffered to some extent from their parasites. But only when the *Stoll* count indicated more than 10000 eggs was there evidence of hookworm disease with its pathognomonic features. In 3 cases, symptoms were severe. The highest number of eggs encountered in 1 cc. of stool was 36500, accompanied by a hemoglobin content of 23; and the first specific treatment of this patient with oleum chenopodii yielded 856 necator worms in the dejection.

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* 4 cc. of stool are added to 56 cc. of $^{1}/_{10}$ normal sodium hydroxide solution in a special graduated flask. The mixture is vigorously shaken with glass beads to obtain an even suspension of the fecal matter. 0.075 cc. of the suspension are pipetted on a large slide with a lining of square millimeters which is covered with a large cover-slip. All eggs present are counted with low power. The total number of eggs from two consecutive counts is multiplied by 100, which gives approximately the number of eggs in 1 gram of stool. If the fecal matter is soft or nearly liquid, a higher multiplicator (150–200) must be used, so as to calculate the number of eggs on the basis of formed stool.

CONCLUSIONS

Hookworm incidence among the population of Preston Division is low. It is probable that less than 10% of the laboring class are infested; and the great majority of these carriers show no symptoms of suffering from harboring the parasites. Only occasionally is an actual case of hookworm disease observed, which manifests itself by a *Stoll* count of more than 10000 eggs per cc. of formed stool.

Patients showing 2000 to 10000 eggs require attention and specific treatment.

Cases with egg counts up to 2000 are clinically negligible, unless hookworm is associated with other anemia-producing diseases and faulty nutrition. A period of hookworm treatment of such individuals is often indicated; but one should not cling to the belief that he has thereby gotten to the root of the evil.

To paraphrase *Manson-Bahr's* metaphor: hookworm may be the straw that breaks the camel's back, but yet, it remains a straw. Far more important is it to relieve the patient from his other burden—i.e., to teach him the measures for the prevention of hookworm infestation and the principles of a well-balanced diet.

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LOBAR PNEUMONIA

B. M. PHELPS, M.D.

Truxillo Railroad Company Hospital

Puerto Castilla, Honduras

The author has made a survey of the cases of lobar pneumonia treated during the current year to note (a) fluctuation in the total number of cases treated; (b) the influence, if any, of temperature and rainfall, sex and nativity; and (c) the methods of treatment used, especially in reference to the use of digitalis. There were some changes on the medical staff and the cases surveyed occurred on the services of three different physicians.

The average number of persons dependent on the hospital for treatment was 8,935; this being an increase of 941 persons over 1929. The only two cases coming from outside towns, the population of which was not included in our census, died.

The total rainfall in 1930 was 9.17 inches less than in 1929. The mean temperature for 1930 was 2.0°F. less than in 1929. As usual, there is no demonstrable relationship between the incidence of lobar pneumonia and the changes in the seasons of the year which, in this climate, involve comparatively slight variations in the temperature but often marked differences in the quantity of rainfall.

TABLE 1

COMPARISON OF MORTALITY RATES

Year	Number of Cases	Number of Deaths	Per Cent
1921	31	8	25.80
1922	60	39	65.00
1923	97	52	53.61
1924	101	43	42.59
1925	100	30	30.00
1926	63	23	36.50
1927	55	21	38.18
1928	76	30	39.47
1929	89	17	19.10
1930	56	16	28.57

TABLE 2

SEASONAL INCIDENCE

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Total
Cases	4	3	4	3	5	2	4	7	4	7	7	6	56
Deaths	1	0	2	0	1	0	3	3	1	1	2	2	16
Per cent	25.00	0	50.00	0	20.00	0	75.00	42.85	25.00	12.28	28.57	33.33	28.57
Av. Rainfall (in.)	8.85	4.85	2.06	3.94	2.49	6.33	10.20	6.86	5.54	6.42	12.03	11.76	81.33
Temperature (mean)	75.5	77.0	77.5	77.5	82.0	80.5	79.5	81.0	80.5	82.5	80.5	76.5	79.0

TABLE 3

CASES BY NATIVITY

	Honduras	Jamaica	Salvador	Guatemala	Nicaragua	Total
Cases	43	1	6	1	5	56
Deaths	10	0	2	0	4	16

TABLE 4

CASES BY SEX

	Male	Female	Total
Cases	47	9	56
Deaths	12	4	16
Per cent	25.52	44.44	28.57

As will be noted, no cases of lobar pneumonia occurred among individuals coming from the temperate zone. This is quite striking when it is considered that many of our European and American employees are as much exposed to exertion and the elements as the natives who contracted the disease.

COMMENTS

Of the cases treated, 43 were employees with a mortality rate of 25.58% and 13 were non-employees with a mortality of 38.46%.

The patients came from 30 distinct and well separated localities having very little contact. As usual, the greatest number of the cases (15) came from the Port town where the largest population is concentrated. The other cases were distributed throughout the remaining districts.

The average period of hospitalization was 14½ days; but this included cases dying, many of whom survived but a very short time. With one exception, all patients recovered who had been sick 3 days or less before coming to the hospital, The exception was a case which developed pneumonia in the hospital many days after admission, and while under treatment for a fractured spine with complete transverse myelitis. Two cases developed pneumonia suddenly after severe trauma to the chest. One case of a child, aged 4 months, was improperly recorded; the history, physical findings and temperature chart pointing to bronchopneumonia.

POST MORTEM FINDINGS

Five of the fatal cases came to autopsy. In all these instances the extent of the pneumonia had been properly diagnosed, but complications were frequently overlooked. The gross findings are noted below:

Case No. 1.—Involvement of right upper and lower lobes; Bronchopneumonia, left lower lobe; Old pericarditis; Old infarcts of kidneys; Atrophic cirrhosis of liver; Atrophy of mucous membrane of stomach; Atheroma of aorta.

Case No. 2.—Involvement both lower lobes, right upper and middle lobes; Abortion at 3 months; Tertiary syphilis; Acute nephritis; Uncinariasis.

Case No. 3.—Involvement left lower and upper lobes; Chronic myocarditis; Bronchiectasis; Chronic pleurisy; Acute nephritis; Chronic splenitis.

Case No. 4.—Involvement both lower lobes; Small necrotic area in liver; Chronic splenitis.

Case No. 5.—Involvement both lobes left lung; Acute pericarditis; Small pleural effusion, left chest; Chronic splenomegaly; Fatty degeneration of liver.

TREATMENT

Treatment administered was usually symptomatic.

It is interesting to note, in line with the work of Wyckoff, Du Bois and Woodruff,[1] that 28 patients received digitalis during the course of their treatment, of whom 7 died; and 28 patients received no digitalis, 9 dying. No effort was made to treat cases of similar gravity with and without digitalis, and no cases of auricular fibrillation were registered in this series.

Intravenous mercurochrome was used in 7 cases only. Single doses were given to 6 cases as early as the second day and as late as the eleventh day; and all of these cases recovered. The 7th case was given mercurochrome on the 7th and 11th day, but died on the 36th day with complications of septicemia and nephritis.

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TYPHOID FEVER IN BANES, CUBA

P. S. Malaret, M.D.

United Fruit Company Hospital

Banes, Oriente, Cuba.

Description of Area.—The Banes Division sugar cane plantation and sugar mill of the United Fruit Company comprises 37,000 acres of land, located in the northeastern coastal plain of the province of Oriente in the Island of Cuba. In addition to the large number of labor camps that are scattered throughout the extensive area which is planted in sugar cane, there are also several centers of population—viz., the administration centre in Banes; the sugar mill at Macabi; the shipping centre at Embarcadero; and the four district headquarters at Deleite (DistrictI), Negritos (District II), Torrenteras (District III), and Los Angeles (District IV). The Company's administration centre is contiguous to, and essentially part of, the local town of Banes. Interspersed within and adjacent to the Company property are a number of private farms. According to the latest census, the town of Banes has a population of 12,258 persons and the whole municipality totals 32,472. The whole area of District I and the major part of District II are outside the limits of the Banes municipality, and within the neighboring municipality of Antilla.

Water Supply. The camps, farm bateys and population centres in Districts I and II obtain their water directly from the adjoining Preston Division. This water is excellent, and is well protected against contamination.

The water supply of Banes proper, on the other hand, is quite deficient. The local Banes town obtains its inadequate supply from two sources—a small dam located in El Negro River at a point about 4 kilometers from Banes town; and another small dam, in the Banes river, situated directly behind and immediately adjoining the town. Both of these water supplies are unprotected against pollution, and examinations in the National Bacteriological Laboratory in Havana showed the following analysis:—"*Date, December 17, 1927. Analysis No. 95310. This water contains Standard Method A. P. H. A. of 1925: Number of Colonies,* *7,200 per 1 cc.; Bacillus Coli, 10 per 1 cc.; Pathogenic bacteria, None; Eggs of helminths, None; Streptococci, None; Protozoa, None. Conclusion: This water is bad as shown by the excessive number of Colonies in cultures and by the presence of bacillus coli.*" The chemical analysis gave the following conclusions: "*The sample of water analyzed is bad. . . . . in its physical character (appearance and odor) and in its chemical characters because of the presence of nitrites, free ammonia, and excess of organic matter. And the dry residue, magnesium oxide and anhydrous sulphuric acid being above the limit permissible in such waters.*" These dams and the distribution system are owned by a private individual, and not by the municipality.

The Company's section also obtains its supply from two sources. One is a dam in a nearby hill (called Jagueyes dam), and the source of supply is from an underground river. The equality is quite satisfactory, as is shown in the following analysis: "*Bacteriologic—Standard Method A. P. H. A. of 1923. Number of Colonies, 40 per 1 cc.; Bacillus Coli, None; Pathogenic bacteria, None; Eggs of helminths, None; Streptococci, None; Protozoa, None. Conclusion: This water is good. Chemical analysis—Conclusions: The sample of water analyzed is potable and within the physical characteristics and chemical limits set by National Department of Health.*" Its only drawback is its hardness, which is due to a high mineral content. This source supplies the Company's portion of Banes town. Because of its hardness and because of its intermittent scarcity, most of the houses of the higher class employees are provided with rain-water cisterns; and this water, which is boiled before it is used, is practically the only water drunk by this group. The rest of the people residing in this locality use the tap water, and usually do not take the precaution to boil it. There is one section within the Company's urban area which is of major importance in connection with our typhoid situation. This is called La Güira. It is inhabited by an inferior class of laborers; and in this section, in addition to numerous common water taps, there are also a number of wells and springs.

The second source of water supply is a Company dam over the Banes river with its intake a short distance above that of the other source of supply described in the preceding paragraph. The water from this reservoir is conveyed by pipe lines to the Mill at Macabi. Throughout Districts III and IV, which are nearest to the town of Banes, there are a number of wells in use in addition to the taps on the pipe lines. The waters obtained from these sources have never been subjected to a bacteriological analysis.

Milk Supply. The Company has a dairy about a mile from Banes, which was built recently and which conforms with Government Regulations. It is provided with an abundant water supply obtained from its own well. Proper precautions are observed in handling and distributing the milk. All the milk is delivered in bottles, and the bottling is done by machinery. The personnel of the dairy is carefully supervised by the Company's Medical Department.

The dairies from which the town of Banes obtains its milk supply are inadequately constructed, and it is not properly protected against contamination.

Living Conditions.—The living conditions in the area differ markedly in different groups:

Living conditions in the town of Banes are very poor. Most of the residences are old, dilapidated, unscreened frame houses; and are provided only with pit latrines of the most primitive type, which are not protected against the access of flies. The better class of people live under very good conditions; but they form only a small percentage of the total population.

The Company section of the town may be divided into the American Section, where both American and higher class Cuban employees live, and the laborers' sections. The American section consists of well built, well kept, screened houses, with abundant and wholesome water and milk supplies, and good plumbing and sewer systems; and may be compared favorably with a modern suburban section in the United States. The people who inhabit these houses conform readily with the modern rules of hygiene. I have never heard of a case of typhoid fever originating in this section. The laborers' section consists of good, comfortable houses; but they are not screened, and are without a rain-water supply.

The La Güira section has been mentioned previously. It is inhabited by an inferior class of laborers, including a large number of Jamaicans; and is very insanitary. The houses are, for the most part, privately owned; and are generally of the poorest type of construction. The people live under exceedingly bad hygienic conditions. Such latrines as they have provided are of the most rudimentary type, and are constant sources of fly breeding. Undoubtedly, there are many typhoid carriers in the village; and the wonder is that typhoid fever does not assume greater proportions.

In the country districts, where typhoid fever cases are rare, the population is well scattered; and the penetrating sunlight and the care taken of the laborers' camps prevent widespread contamination.

This, then, is a description of the area from which 51 cases of typhoid fever were admitted to the Company Hospital during 1930. That the disease has been endemic for a great many years is evidenced by our records, which show 466 cases treated in our Hospital during the period 1918–1930, inclusive. During the same period, the Preston Division, which immediately adjoins the Banes Division, reported only 182 cases, as shown in the following table:

TABLE I

13–Year Period 1918–1930

Typhoid Cases Treated in the Hospitals at Banes and Preston

	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	Total
Banes	64	63	23	6	26	25	36	35	22	33	39	43	51	466
Preston	24	15	12	9	13	8	16	13	13	13	6	10	30	182

This difference has existed, in spite of the fact that both Divisions produce the same crop; and the terrene, meteorological and climatic factors are almost identical. The higher incidence of infection in the Banes Division, then, must be attributed to the dissimilarity in the character of the inhabitants in the population centres and the marked difference in the water supplies of the two Divisions. The Preston Division is a more compact agricultural unit; and is somewhat more isolated than the Banes Division, not having in its midst a local town with contaminated water and food supplies. Preston is favoured with a good water supply obtained from three reservoirs located in the surrounding hills about eight miles from the Central; and from these reservoirs the water is piped throughout the whole Preston Division and part of the Banes Division, for use in the fields and in the labor camps. Banes Division, on the other hand, has its centre of activities within the boundaries of the local town, in an area which is quite densely populated. For the most part, the population consists of poor people who live under very bad hygienic conditions, with a deficient water supply and defective sewage disposal as already described.

Distribution of Cases by Locality.—The 51 cases admitted during 1930, and which form the basis of this report, came from the following localities within the area—each name representing either a camp or population centre which is separated from the others.

TABLE II

Localities

District No. I			
Calabazas #6	1		
Calabazas Ext. #7	2		
Feria #5	1		
Deleite Batey	2		6
District No. II			
Pilon-Antillita	1		
Los Negritos	1		2
District No. III			
Macabi	1		
Tasajeras	1		
4 Veredas	1		
Cano #10	1		
Cano #11	1		5
Banes Town			
Reparto Cardenas	6		
Reparto Quiñones	1		
E. Street	5		
Banes general	3	15	
La Guira	17	17	32
District No. IV			
Mulas	1		
Cañada Honda	4		
Duruthy	1		6
Total			51 Cases

Districts I and II, which obtain their water supply from Preston, had 6 and 2 cases respectively, or a total of 8 cases. Districts III and IV, with a water supply obtained partly from Jagueyes dam (supposedly good) and partly from local wells and springs, had 5 and 6 cases respectively, or a total of 11. The difference is slight, when we consider that the latter Districts are closer to and in more intimate contact with the town of Banes.

The local town of Banes shows 15 cases admitted to the Hospital; and undoubtedly many cases were treated in their homes by local physicians. No cases developed in the section of Banes where the Company's administration centre is located. From the La Güira section, which has been described previously, 17 cases were admitted to the Hospital.

A study of these 51 cases by months shows the following:—

TABLE III

Date of Admission

January	3 Cases
February	4 "
March	13 "
April	7 "
May	6 "
June	1 "
July	3 "
August	3 "
September	4 "
October	2 "
November	2 "
December	3 "
Total	51 Cases

It will be observed that 13 cases (25%) occurred in March, and a total of 26 of the cases (50%) were admitted during March, April and May, indicating that the spring months of 1930 were the most favorable for the spread of the disease. However, the series is so small that no definite conclusions can be advanced at this time.

Of the 51 cases, 23 or 45% occurred in children up to 14 years of age, and 28 or 55% in the other age groups. This is in accordance with expectations that the earlier age groups would show a higher incidence, since the percentage of immunes in an endemic area should be higher in the older groups.

Race Groups.—The incidence among individuals of the various races was in proportion to the ratio of each race to the total population, and did not indicate any special affinity of the disease for any given race group.

Sex Groups.—There were 36 males (70.58%) and 15 females (29.42%) treated in the Hospital. When classified by age groups, it is of interest to note that there were only 5 female children as compared with 18 male.

Employment Status.—Of the cases admitted, 17 were male employees of the

Company; 32 were members of the families of employees, and of these 23 were children and 9 were adults; and 2 were not connected in any way with the Company.

CLINICAL DATA

While investigating the epidemiology of the disease a number of clinical factors were noted and are here recorded to complete the description of this series of cases and to serve for future comparison.

The duration of the disease did not show any deviation from the average. The exact duration was difficult to determine in many of these cases, as the patients were unable to give a clear history of the onset and course of the disease prior to admission. However, if the histories are given credence, one case—an adult Jamaican negro—was admitted 12 days after the initial rise of temperature and had fever for 49 days in the Hospital, making a total of 61 days of illness, with recovery. There were several cases of 12 to 19 days duration. The length of illness in individual cases varied markedly, within these two extremes.

TABLE IV

Duration of Disease

0–19 Days	20–29 Days	30–39 Days	40–49 Days	50–59 Days	60–69 Days
15	15	15	1	3	2
29.40%	29.40%	29.40%	1.96%	5.88%	3.92%

Blood examinations on the first 5 cases admitted during the year did not include a Widal reaction nor blood culture, as the laboratory was not equipped at that time to take care of such work. Of the other 46 cases, 37 gave either a positive Widal reaction or a positive blood culture.

Complications. A fairly large percentage of the cases ran their courses without any major complications. Practically all of them had either normal bowel movements or persistent constipation which required frequent enemas. Acute bronchitis, enlarged spleen, and acute nephritis were frequently noted. Intestinal hemorrhage was present in 4 cases, but in none of these was it of an alarming character.

Urinary retention occurred in one case—a male, adult Cuban—whose temperature became normal on the 51st day; but he required catheterization only during the second week he was in the Hospital.

One case that died—a female, adult Cuban—had a pronounced toxic goiter. She was admitted to the Hospital, in a very toxic condition, 9 days after the beginning of her illness; and was in the Hospital only 5 days.

A female, adult Cuban, who was admitted after having been ill in her home for one month, had had a paralysis of both legs for many years. This case recovered.

One case was of special interest. A female, adult Cuban was admitted with a history of pain in the right lower quadrant for 18 days; and a diagnosis of acute appendicitis had been made by a local physician. She was six months pregnant; and had developed fever a few days before admission. Although the leucocyte count was low, (9,250) and the temperature very high, (102°F. to 104°F.), a diagnosis of acute appendicitis was made following persistent complaint by the patient of excessive pain over the region of the appendix. A satisfactory physical examination of the abdomen was difficult, because of the 6-months pregnant uterus. She was operated for appendicitis on the second day following admission; and a slightly congested appendix was found, which contained numbers of Oxyuris vermicularis in its lumen. We attributed the pain to the presence of the worms, not thinking of Peyer's patches. Unfortunately the appendix was not submitted for pathological examination. The next day a Widal was negative, as were other routine laboratory examinations. The patient continued to have a high temperature. On the 6th day following operation 3 Michel's clips, and on the 10th day the silk sutures, were removed from the wound. A second Widal was negative at this time. Repeated examinations failed to reveal any definite condition to account for the symptoms, except that occasionally a few pus cells appeared in the urine; and, as the temperature curve was very suggestive of typhoid, a third Widal was ordered. It was now the end of her third week in the Hospital. The reaction at this time was frankly positive, in a dilution of 1–100. On the 31st day following admission another Widal, done as a check, was also positive 1–200. The temperature became normal on the 36th day after admission. Convalescence progressed satisfactorily, and she was discharged one week later. In connection with this case, we beg to quote from an article on Oxyuris in the Archives of Pathology for February 1931, by Jones and Bunting,[1] in which they state: "*Heller regards the presence of Oxyuris in the lumen of the appendix as of no pathological significance. This would seem to be true. However, as is shown definitely in the reports of Cecil and Buckley and of Rheindorf, the worm may invade the walls of the appendix and may possibly penetrate even to the serosa. This raises the question of the part played by the worms in initiating appendicitis. Cecil and Buckley concluded from their study that there is a definite and characteristic form of appendicitis produced by Oxyuris and Trichocephalus. Rheindorf was of the same opinion. Aschoff, in controversy with Rheindorf, took an opposite position and spoke of a "pseudoappendicitis."*"

Another case—a male, adult Haitian—was of special interest because of the fact that, according to his statement, he had had continuous fever for 16 days before he entered the Hospital. He had a fever for only 3 days following admission. He was in very poor physical condition when admitted; and almost immediately developed a tremor of the whole body, which was most marked in the arms and legs. This condition persisted for 32 days following his admission; at which time he was discharged, upon his own request, to return to his family. The Widal was positive on admission.

DEATHS

According to Manson,[2] the average reported death rate for typhoid fever in English statistics is 1:8 persons attacked, although he further states: "but in

India only recently the death rate is stated as rather over 1:3." In our series of 51 cases, we had 5 deaths; which would give us slightly less than 1:10.

Case I.—A male, adult Cuban, from Mulas farm, who had lived in Banes Division all his life, was admitted 11 days after the beginning of his illness. He was in very bad condition, and had acute nephritis. Both the Widal and the blood culture were positive. He was in the Hospital for 13 days.

Case II.—This patient was a male, adult Haitian, who had lived in the Banes Division for 3 months. His general condition, when he was admitted, was very bad. He was extremely weak, and incoherent; and no history could be obtained. The Widal was negative 2 days after admission; but positive one week later. Meinicke Turbidity Reaction for lues was ++. He died 13 days after admission.

Case III.—A male, adult Haitian, was admitted in a comatose condition. No history could be obtained. The leucocyte count was 2,000; the Widal was positive; and the urine indicated an acute nephritis. He died 36 hours after admission.

Case IV.—A male, adult Cuban, from Deleite, was admitted in a comatose condition. His history record showed a high, continuous fever for several preceding days. Nutrition was poor; skin was dry and rough; teeth were decayed; lungs showed some râles at the base; heart sounds were weak and distant; spleen was palpable; leucocyte count was 17,750. The Widal was positive. Death occurred 8 days after admission.

Case V.—A female, adult Cuban, from La Güira, was admitted to the Hospital in extremely bad condition, with all signs of acute toxic goiter. Leucocyte count was 3,750. The Widal was positive. She died 4 days after admission.

CONCLUSIONS

Dr. H. C. Clark,[3] while discussing typhoid fever in Tela, Honduras, says: "*It would appear as if the disease had every natural advantage in our region to spread rapidly and become epidemic but for some reason it does not become epidemic.*" This statement coincides with our experience in Banes. Our records show a fairly even average number of cases occurring year after year with the exception of 1921 when, for some unknown reason, only 6 cases were admitted to the Hospital. Yet an actual epidemic of typhoid fever has never been reported here. Without attempting an explanation of the reasons therefore, we cannot avoid mentioning in this connection the striking fact that 45% of our cases occurred in children up to 14 years of age. This fact would indicate that, if this same proportion holds for previous years, a high degree of immunity must exist in the permanent adult population. Many cases of typhoid must occur annually which are never diagnosed as such; and the cases admitted to the Hospital for treatment represent only a small proportion of the whole. We had under our care a girl who was admitted with a history of fever for 8 days. She did not appear ill; and the temperature curve was most atypical—it would reach normal and remain normal for a day, and then another slight rise to 101°F. would occur. Clinically it could not, by any stretch of the imagination, be called a case of typhoid fever; and yet a slow pulse the day she was admitted, with fever and a low leucocyte count (5,000), suggested a Widal which was frankly positive. The Widal was repeated a second time, as a check; and found again to be positive. Many such cases must occur which, never recognized, carry on a continuous process of immunization.

As to the actual cause of the endemic we may say that, in the local town, everything is favourable for the spread of typhoid fever—a contaminated water supply; milk and milk products handled in an insanitary manner, where flies swarm everywhere; rudimentary and unclean pit latrines; a warm, moist climate; and the continuous existence of carriers. In the Company section these conditions do not exist, except in La Güira where pit latrines are numerous and there is prolific breeding of flies throughout the year.

According to R. B. Norwent,[4] contact with carriers and unrecognized cases of typhoid are the most important sources of rural typhoid. This is the impresson gathered by those who have had to deal with typhoid fever in Banes. Dr. W. Menk[5] says *"Typhoid fever was observed almost exclusively in the two districts of Banes and Los Angeles. It seems to have occurred chiefly as a house or family epidemic in rural regions where the water supply, unhygienic disposal of stools and urine, general filthiness and abundant fly breeding explain its presence."* And Dr. Juan R. Ariza, Medical Superintendent, states in his 1928 Report: *"In one case only, water was the medium of infection. The water supply, a well, became infected through the improper disposal of undisinfected excreta of a typhoid patient. We were able to culture the typhoid bacillus from the well water. In all the other cases investigated, infection occurred through the medium of flies or from direct contact."* He also says: *"We know that the incidence of typhoid cannot be prevented in Banes, for the laboring population is constantly changing and the influx is frequently from localities where there are foci of infection."*

This, then, is the situation in Banes. Were it possible to provide an efficient water works plant and sewerage disposal systems for the local town; and were the handling of the milk supply strictly controlled; there is no question that there would be a reduction in the incidence of typhoid fever in this area. Since such projects will not be realities in the near future, it behooves us to consider what measures would be of practical value at the present time.

In so far as the La Güira section is concerned, much good could be accomplished by persistent, continuous efforts to eliminate the unsanitary, unhygienic, living conditions of its inhabitants. Their shacks, although built on Company land, are all of private ownership; and were built during the early development era of the Division. Proper sanitary control could be exercised, under present conditions, only by government authorities. Aside from this, the one sovereign control measure would be anti-typhoid vaccination, *if carried on efficiently*; as, if not, it will prove ineffectual. The Company has had a Vaccinator on the payroll for 14 years whose only duties have been to vaccinate throughout the whole municipality. He is under the control of the Local Government Health Officer, and reports having done many thousands of vaccinations yearly.

However, if we were to judge merely by the number of typhoid cases reported, we must conclude that this measure is of little value or that it has been improperly carried out. We know, from the experience of others, that vaccination is an efficient means of controlling the disease; and that, if it has failed in its purpose, it must be due to a faulty method of application. The difficulty here has been the attempt to utilize the three-injection method, without keeping proper records for each individual vaccinated. Whereas many will be given the first injection; only a small portion of these will get the second; and a very small percentage of the whole will get the third. Again, the period elapsing between injections has not always been the proper one; and, as might be expected, the results obtained from such faulty methods have been most unsatisfactory.

The single injection method is now being used; and it is our belief that a larger number of persons will be actually immunized in the future. A great help in this direction would be the strict enforcement of the rule requiring vaccination of all employees and members of their families who live in areas where cases of typhoid fever are reported. Failure to comply with this rule should mean instant dismissal. Only by such "strong-arm" methods will we be able to effectively control the disease—in the Company area at least.

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BERIBERI-LIKE POLYNEURITIS

WALTHER JANTZEN, M.D.

Truxillo Railroad Company Hospital

Puerto Castilla, Honduras

In the 16th and 17th (1927 and 1928) Annual Reports of the Medical Department of the United Fruit Company, I reported the existence of beriberi-like polyneuritis in this Division. I noted that there had been an increase in the number of cases in the year 1928; as, instead of 5 cases in 3 years (1925–1927), there were 18 cases with typical symptoms in the year 1928.

The years 1929 and 1930 brought a slight decrease: 11 cases were observed in 1929 and 11 cases in 1930. Among those treated in 1929, was one case who had been treated previously in 1928 and was treated again in 1930; and another case entered the hospital three times in 1930. Two rather severe cases were still under treatment in the hospital when this report was prepared. In the dispensary of this hospital, I saw two cases; and both had been suffering from their symptoms for several years. Doubtful cases, with only subjective disturbances of sensation, are not included in these figures.

My articles on this disease have, in the meantime, stimulated the publication of other cases similar to ours. These cases were observed and studied by Pineda and Guerrero in Trinidad de Santa Barbara, Honduras. In the cases mentioned by these authors, the mixed type was the most frequent one. In most cases, the nervous disturbances started first; and, later on, edema was found over the whole body or parts of it. Similar to our cases, almost all patients were adults of the male sex. There was apparently no direct contact between the various cases. All were scattered among different houses and *pueblos*. Not more than one case occurred in one family.

The clinical features of our more recent cases did not differ in any way from those of the patients who entered the hospital 3 years ago. There were patients who came to the hospital on stretchers and who were unable to walk without crutches for quite a long while afterward. There were other patients who were bothered more by a feeling of numbness and other disturbances of sensibility than by decreased motor functions of their muscles. An *edematous stage*, as is usually described as typical in beriberi cases, was not seen during the past two years, providing that slight edema of the legs is not included under this classification.

With regard to the cause of our provisionally classified *beriberi-like polyneuritis*, we did not come to any better conclusion than the one advanced previously. The food-deficiency theory did not explain very well the pathological changes. Meat, corn, beans, cheese and rice were, in the main, the food our patients used. It must be admitted that the food of our patients did not correspond to the modern principles of diet, but it is impossible to say that their food was very poor in vitamin B. Besides, it is the food of all middle and lower class Honduraneans and one would think that the disease would have spread over large areas by this time if diet were the primary etiological factor. Other causes such as poisoning with arsenic or lead, alcoholism, syphilis, and frequent infections with malaria, could also be excluded for the cases observed during these years. Improved social conditions did not seem to prevent our patients from contracting this disease. We saw, among our patients, a native overseer from one of our farms, a foreman, and a fireman. A young Chinaman, who was one of our patients and who came to the clinic for treatment only, was working as a waiter in a small hotel in a nearby village.

The prognosis seems to be good in most cases, but the disease is often of long duration. We have observed several patients who left the Hospital one or two years ago, and who remained quite well and completely able to work. But we found relapses also. One patient entered the hospital three times in one year for this disease; and another one, a clinic patient, had some symptoms for over two years after he was discharged from the hospital. Within 5½ years, we saw two casualities in connection with the disease; and both patients died with symptoms of heart failure. The organs of the first one, who died 5 years ago, were not examined microscopically, and therefore the diagnosis was not proved definitely; but the clinical symptoms were typically those of beriberi, and death occurred during the acute nervous stage of the disease. The second casualty which occurred this year, as will be shown below, was probably not connected directly with the nervous affection. This case was under our observation for an extended period.

The following reports of a typical case and of the last mentioned casualty, respectively, will illustrate the clinical symptoms of the disease.

CASE NO. 1

A Honduranean, aged 29 years, who had been a fireman for more than 5 years, was sick for about 5 months. He complained of having had pains in the lower extremities. He entered the hospital for this trouble in June and August, 1930, for about 2 weeks each time. He entered the hospital again on October 18th on account of the same trouble. The food consisted principally of rice and meat; although he also ate beans with every meal, but no fruits.

Physical Examination.—He was fairly well developed and nourished. Both lower extremities were very atrophic, and there was a pronounced tenderness of the calves on pressure. The teeth were bad; but otherwise the head and the organs of the chest were normal. The margin of the spleen was palpable one finger below the costal margin. The knee jerks and tendo-achillis reflexes were absent. The deep reflexes of the upper extremities were present, as were also the cremasteric and the abdominal reflexes. The Babinski test was negative. There was a marked weakness in the legs; and he was unable to walk up stairs or to sit up from the lying position without help of his arms. There was loss of the tactile sense over the skin of the lower legs; and a decrease of the pain sense to pin pricks over the same area. The bladder and other sphincters were normal. The blood was negative for malaria and syphilis. The urine showed a certain amount of pus cells.

Developments.—The treatment consisted of strychnine, quinine and salicylates and food rich in vitamines. The patient ran a normal temperature during his stay in the hospital. The nervous condition improved slowly, and he was discharged after 27 days of treatment.

CASE NO. 2

A. G., Honduranean, 38 years of age, foreman of San Juan Farm, entered the hospital first on the 25th of October, 1928, to undergo an operation for hemorrhoids from which he had been suffering for several months. He complained also of pains and numbness in legs and hands and a weakness, especially in his hands, which had persisted for about one month.

Examination on admission revealed a few small external hemorrhoids, a few bad teeth, and a general atonic condition of the muscles. The patient was able to walk without difficulty. The urine showed a few pus cells. The stool was negative for ova of intestinal parasites. In various examinations, no malaria parasites were found. Hemoglobin was 90%; erythrocytes, 5,600,000; leucocytes, 11,800; small lymphocytes, 35%; large lymphocytes, 4%; neutrophiles, 60%; eosinophiles, 1%. The Meinicke test was negative. The temperature was 97.5 degrees F.

Developments.—The hemorrhoids were removed by clamp and cautery four days after the patient entered the hospital. There was an increase of disturbances in the legs and arms 3 days later. He was unable to walk or get up from his bed. There were no complications directly due to the operation. The patient was transferred to the medical ward. The examination here revealed an atrophy of the muscles of the legs and arms, and especially of the calves. Corresponding to the atrophy, there was a marked loss of strength in the extremities; and especially in the muscles innervated by the peroneal nerves. The movements of the fingers were restricted, through paralysis of muscles and secondary contraction; and the regions innervated by the ulnar nerves were especially affected. The patellar, tendo-achillis, and triceps reflexes were absent; but the cremasteric and the abdominal reflexes were present. The Babinski reflex was negative. All muscles of the legs were painful on pressure. The patient was absolutely unable to walk or to sit up. There was no tactile or pain sense over the skin of the inner side of the calves, and dorsa pedis of both legs. The tactile sense alone was absent over the skin of the flexor side of hands and fingers and of the dorsa of the fourth and fifth fingers. The sense of heat and cold was present wherever tested. The bladder and other sphincters were normal.

The food in the camp, as he told us, was of the usual native type consisting mainly of beans, polished rice, meat, cheese, and plantains.

During his stay in the hospital, the temperature was always normal or subnormal. He was treated with tonics, salicylates, and food rich in vitamines; and the extremities were massaged. Slowly the patient started to walk—at first on crutches. After 120 days of treatment, he was able to leave the hospital and to go to work.

The patient entered the hospital again on the 8th of July, 1930; about 18 months after having been discharged. He had worked most of the intervening time as foreman on his farm. His physical condition had shown steady improvement after he left the hospital. He had observed his diet more closely; avoiding rice, and partaking more liberally of beans, eggs, milk, meat, native corn and plantains. Eight days before he entered the hospital this time, he had had some fever. The fever disappeared, after having taken 30 grains of quinine daily for 4 days; but he felt very weak and came to the hospital for that reason. The chest and abdomen were normal; the pulse fluctuated between 60 and 80; the deep reflexes were absent, but there was no objective disturbance of sensibility. The temperature was again subnormal. Massage and rest improved his condition; so that he was able to leave the hospital on the 15th of July, 8 days after admission.

He returned to the hospital on the 4th of December. This time he was again unable to walk on account of weakness and pressure sensation in the epigastrium. The nervous system showed the same pathology as on the preceding occasion. The heart was slightly dilated, and the liver was swollen and painful. The urine was normal. There were a few tertian parasites in the blood.

The patient died 5 days after admission, with the symptoms of heart failure.

Gross Pathology.—Tall, but very emaciated, body; marked dilatation and hypertrophy of heart (410 grms.); edema of lungs; spleen enlarged (450 grms.) and hard, its capsule showing small hemorrhages. There was a moderate degree of nutmeg liver (1675 grms.). The kidneys (weighing together, 250 grms.) were apparently normal. The nervous system appeared macroscopically normal.

The microscopical examination (Dr. Nauck, Hamburg, Tropical Institute) did not reveal any pathological changes in the peripheral nerves (nervi ischiaticus and femoralis) nor in the central nervous system.

Comments.—The question as to whether we were dealing with cases of "beriberi" or of "polyneuritis without known cause" did not come to a more positive solution through out observation during the last two years. It is evident that the absence or the rare occurrence of an edematous form of the disease, and the presence of some amount of vitamin B in the food of our patients, make it difficult, as already emphasized in my last report, to believe that the condition can be considered as true beriberi. The autopsy of our fatal case this year did not clarify the diagnosis as there were no pathological findings in the central nor in the peripheral nervous system. The inflammatory process was apparently cured and its damages repaired, when the patient again entered the hospital 18 months after the first attack of his disease. It is probable that the condition which caused him to enter the hospital the second and third times was not similar in character to the general condition observed when he was admitted on the first occasion. A dilatation and hypertrophy of the heart is quite frequently seen as a primary cause of death; and the possibility that this should be considered as the primary diagnosis in this fatal case is strengthened by the fact that there were no objective disturbances of sensibility when examined during the second and third admissions to the hospital—there were only the deep reflexes of the lower extremities missing and a certain degree of atrophy of all muscles present.

The question as to whether we are dealing with beriberi or with a polyneuritis of unknown cause is still debatable, as the autopsy was of no assistance in reaching a decision.

IS CARATE (PINTA) A DERMATOMYCOSIS?

CLINICAL OBSERVATIONS IN 75 CASES OF CARATE IN COLOMBIA

E. THONNARD-NEUMANN, M.D., J. CAMACHO MOYA, M.D.,
and
K. C. BREWSTER, B.Sc.
United Fruit Company Hospital
Santa Marta, Colombia

Pinta, called Carate in Colombia, is distinguished from other diseases of the skin by the intensity and variety of the pigment anomalies which have given the disease its name. It produces hyperpigmentations which appear as bluish black areas as well as deprives the skin of its natural pigment. These latter areas show up on the skin of the colored patient as pink or white spots or patches. These changes can be found simultaneously in the same individual, or one stage may succeed the other. As a rule, it appears that the white variety represents the ultimate stage of the pathological process. The experienced observer will even then, when only white pigment-free areas are present, still be able to differentiate between carate and vitiligo.

The studies published in this report were made in the same locality where Wise (1914), Urueta (1924), Menk (1926), Register (1927) and Fox (1928) had made their observations.

Since Montoya y Flores found more than 20 different fungi on the lesions of carate patients, the disease has been placed among the dermatomycoses of hot countries. The majority of subsequent observers have limited themselves to studies of the connection between the different fungus types and the color varieties of the disease. To our knowledge, Menk was the first one to publish the high incidence of positive Wassermann reactions found in our carate patients. Menk, in 1926, found 69.5%; and Register, in 1927, 80.6% positive tests. Menk in 1926 ventured the opinion that the development of carate was in some way related to an old treponematosis; and that there was an association, at least, of etiological factors, such as treponematosis and mycosis occurring at the same time. Fox quoted in 1928 Arjona, Folkes, Castellani and Menk who all reported difficulties in finding fungi in impressively large numbers by direct microscopical examinations. Fox himself, in spite of the most careful examination of many scrapings from 30 separate skin areas, found fungi to be present in only one case.

His cultures showed growths of different fungi, such as Trichophyton, Macrosporium, Penicillium, Stemphylium, Monosporium and Madurella alone or in association with cocci and bacilli. However, cultures from the skin of two *normal* persons showed fungus growth as well. The experiences Menk, in 1926, and Brewster, in 1929, had with their cultures were similar to those of Fox. Brewster's attempts to transmit carate directly, either in the same patient from a diseased to a healthy skin area or from a carate patient to a healthy person, resulted negatively without exception. Fox states that "the etiology of carate has by no means been definitely settled because we are able to cultivate various fungi from the skin."

Castellani's researches in Honduras lead him to conclude that the etiological rôle of these molds described by other observers is doubtful, and that in all probability the organisms seen by himself were only saprophytes. Bloch, of Zurich does not think that the disease can be caused by Aspergillus, and to him, the whole picture suggests an endogenous origin. It does not seem probable, he says, that the change in the pigment could be produced by any Epidermophyton, as this is a fungus which vegetates only in the most superficial layer of the epidermis.

Microscopic examinations of skin sections from five patients, which were done for Fox by Highman, showed vacuolization of the rete cells, absence of elastic fibers in the papillae and the subpapillary region, and pigmentary dystrophy; and the conclusion was reached that the process was evidently a mild inflammation. Microörganisms were not found in any of the sections.

As far as we could learn from the literature, all authors agree that no internal organic lesions are associated with the disease. In view of the unsatisfactory results obtained so far in efforts to ascertain the etiology of carate through dermatological methods; we decided to have a number of hospitalized carate patients undergo a more detailed clinical observation, including roentgenological and serological examinations.

The history we obtained from our patients confirmed the observations of previous authors regarding the chronic character of the disease. The time between the onset and the date of observation varied from 1 month to 40 years.

The family history of the patients did not develop any particular information, especially as there was no instance given in which an unusually large number of members of the same family were affected.

All patients of this series who, at the time of our examinations, showed pigment anomalies of the pink and white types only, stated that previously they had suffered from "blue" carate. All other cases who could not remember having had any hyperpigmentation in the past, were disregarded in order to exclude vitiligo.

The ages of the 75 patients varied between 12 and 75 years. There were 34 of them who were not older than 30 years; and, among these, the average duration of the disease was 7 years. The statements made by the older patients, on account of their long standing skin affections, were unreliable.

The questioning of 67 male carate patients regarding a chancre infection resulted in only 9 cases (15%) making an affirmative reply, while 58 cases (85%) gave a negative reply; whereas the history of about 200 patients free from pinta revealed that 40% had suffered from such an infection in the past.

In this connection, it was impossible to determine from the patients whether or not their venereal sores were chancres, chancroids, or mixed infections; but this data is of no special importance as the figures given here serve for comparative purposes only. There is, however, the interesting fact to be mentioned that during the last two years there was no positive dark-field examination for Treponema pallidum obtained from any carate patient who suffered from a genital sore.

Let us compare these figures with the results of our serological examinations:

During the year 1929, 1583 Wassermann and 1571 Kahn reactions were performed in this hospital. Of these, 602 Wassermann and 667 Kahn reactions were positive. Routine serological examinations were done only on cases which were suspected of syphilis; and, among these *selected* cases which included many carate patients, 40% showed a positive reaction.

In the carate cases of our series, which were all observed in 1930, a blood serum reaction was considered positive only when *both* the Kahn and the Wassermann tests were distinctly positive.

Among 72 carate cases, these tests were positive 65 times (about 90%); strongly positive (3 and 4 ++++) in 53 cases (73½%); and negative in only 7 cases (about 10%).

The clinical examinations of our carate patients revealed, in a surprisingly large percentage, pathological conditions of the circulatory system which involved the heart muscle, the aortic valve and the aorta. These affections were not confined solely to the older patients. Among 34 carate patients who were 30 years of age or less, no less than 30 showed anomalies of the heart or the aorta although 10 were only of a moderate degree. Among 64 carate patients, 52 (about 80%) showed a dilatation of the aorta; whereas a control series of 50 patients who were free from pinta showed such changes in only 26 instances (about 50%). In 33 of 64 pinta patients, these changes involved either the aorta ascendens, or the aortic arch, or the entire section of the aorta which is visible above the heart shadow under X-ray examination. Enlargements of the heart were encountered 24 times, and, with three exceptions, were of the abnormal aortic configuration (goose heart).

Alterations of the heart sounds were recorded in 36 instances.

Organic lesions of the central nervous system were found in 7 out of 72 patients. Among 5 spinal punctures, two showed a positive Wassermann reaction in this fluid. Of 52 patients, 41 presented enlargements of the peripheral lymph glands and especially of the epitrochlear glands.

The dermatological aspect of the carate lesions has found ample consideration in previous reports; but, as far as we know, no reference has been made to the bilateral symmetrical arrangement of the efflorescences which are often very striking.

Distribution of the Skin Lesions in 64 Cases

(1) Symmetrical	
(a) Both upper and lower extremities—hands and arms, feet and legs	36 times
(b) Both upper extremities—hands and arms	14 "
(c) Both lower extremities—feet and legs	8 "
	52

(2) Asymmetrical	
(a) Face and other parts of the body	10 times
(b) Face alone	1 time
(c) One side of the body	1 "
	12

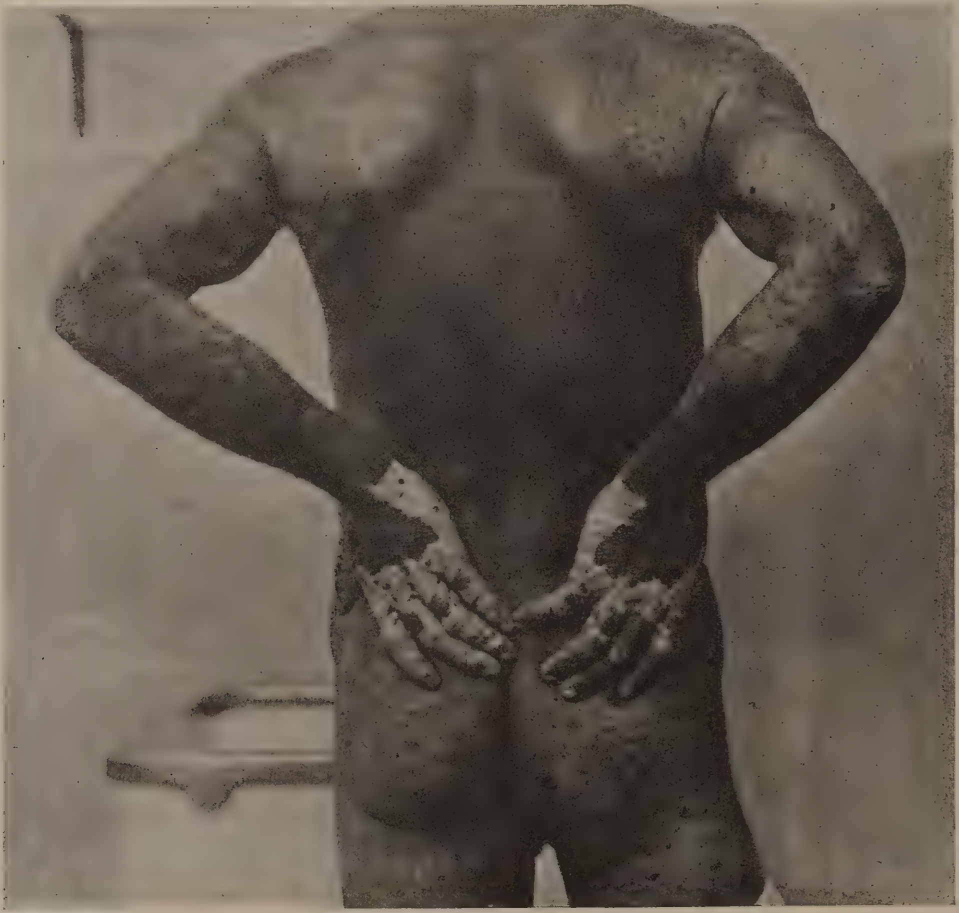


FIG. 1

In some instances the bilateral symmetry of the diseased areas was so pronounced that one side looked like the reflection of the other as will be seen by the accompanying photographs. This held true especially for the areas with little or no pigment. In addition we have seen, and the more observant of our patients have confirmed the fact, that the lesions did not always progress continuously but that frequently new pigment alterations occurred almost simultaneously on corresponding spots of both sides of the body.

That carate, in an appreciable number of cases, responds to antiluetic treatment has long been known. Toussaint, in 1908, mentioned the administration of mercury with curative effect to carate patients in Mexico. Del Pino, in 1912, said, "The only treatment which has proved of value is the anti-syphilitic treatment. By means of this the disease is cured no matter how far advanced it is." As the "Classic Treatment" he mentions calomel, protoiodide of mercury, and potassium iodide.

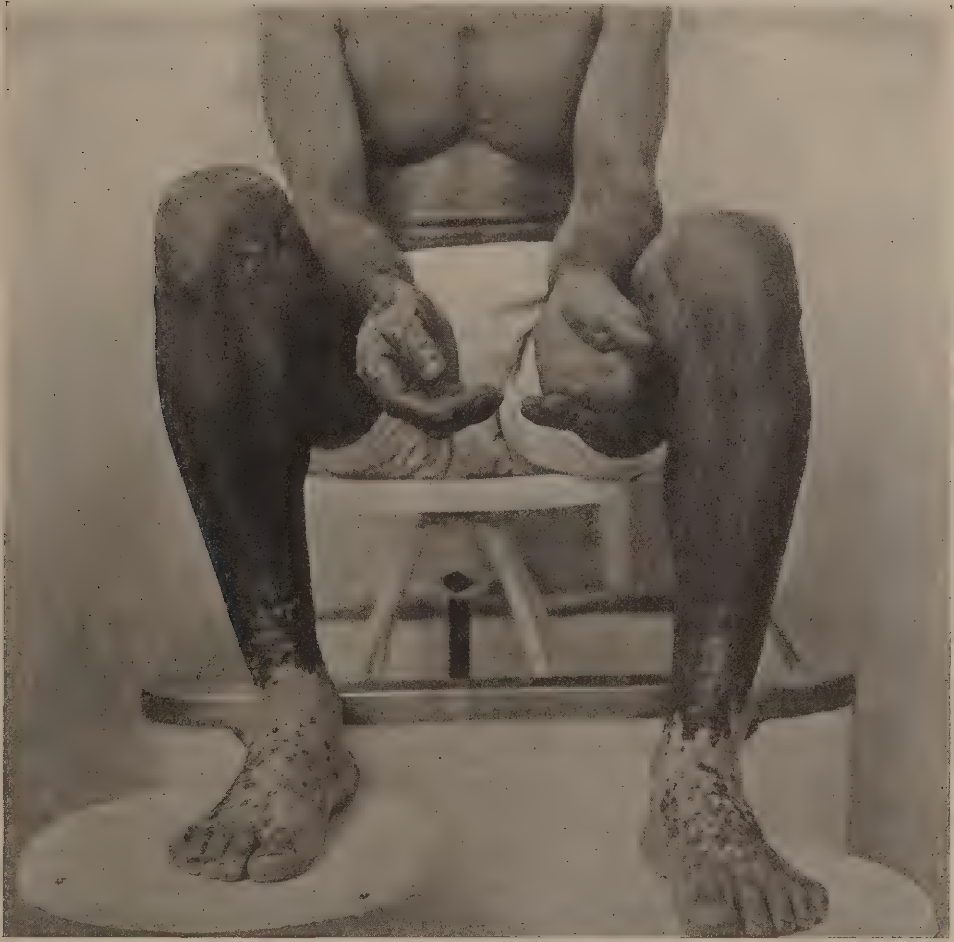


FIG. 2

The experiences of Dr. Drennan with neosalvarsan, in restoration of pigment in even far advanced cases, are very encouraging. On numerous occasions carate patients have spontaneously pointed out to us the places on their bodies where blue spots had disappeared or the white spots had given way to the natural hue of their skin after a few intravenous injections of neosalvarsan. E. Thonnard-Neumann has under treatment at present two cases in which, after injections of bismuth salicylate and internal doses of potassium iodide, the carate lesions have been reduced, up to now, to about one-half of their former size. The Wassermann tests, in both cases, became negative under treatment.

SUMMARY

In 1930, a group af 75 carate patients were examined in Colombia.

(1) 90% showed a positive Wassermann and Kahn Reaction in the blood serum.

(2) 15% admitted that they had had chancre infections (against 40% of the carate-free patients).

(3) 80% showed, under X-ray examination, a dilated aorta.

(4) Over one-third showed enlargements of the heart which were, with three exceptions, of the abnormal aortic configuration.

(5) One-half presented pathological alterations of the heart sounds.

(6) 20 of the 34 carate patients who were not over 30 years showed definite signs of pathology of their circulatory system.

(7) 80% had enlarged lymph glands (epitrochlear, in the majority.)

(8) 80% showed corresponding areas of both sides of the body more or less equally affected. In a smaller proportion the bilateral symmetry of the lesions was very striking.

CONCLUDING REMARKS

In submitting this report we hope that it may be of some help in proving that, in all probability, carate is essentially of an endogeneous origin.

It appears to us more than likely that a disease which produces, in 9 out of 10 cases, a positive blood serum reaction for syphilis; which shows a strikingly high incidence of circulatory lesions characteristic of cardiovascular syphilis; which, further, seems to give a considerable number of its carriers an immunity to a primary syphilitic infection; and which, finally, shows remarkably good results from antiluetic treatment; must be very closely related to a treponemal disease.

The bilateral symmetrical arrangement of the pigment dystrophies seems to point towards an agent working through the vegetative nervous system.

The frequent onset in the adolescent age speaks, perhaps, in favor of a congenital factor. We realize that all these points await further proof and explanation; but we think that further research to determine the etiology of carate will have to take the endogenous factor of the disease into serious consideration.

The two photographs were taken from the same individual for the purpose of showing the bilateral symmetry of some of the lesions. The face and the knee regions showed some "blue" carate, but otherwise the pink and white variety prevailed. The cubital areas and part of the chest were about the only places where the skin had preserved its natural hue, which was a dark chocolate brown.

DERMAL LEISHMANIASIS

O. T. BROSIUS, M.D., D.T.M. & H., F.A.C.P.

United Fruit Company Hospital.

Almirante, Panama.

Two men, a young mestizo and a young negro, were admitted to the Hospital on the same day, from the same camp, and suffering from the same ailment which is comparatively rare in this locality.

Case I.—The mestizo had a large indolent ulcer, situated on the outer aspect of the left ankle; and complained of fever. He stated that the ulcer had begun about two months previously, as a small infection which had spread rapidly in spite of various antiseptics which he had applied. The fever, he believed, was due to the infection; and, therefore, he had not taken any quinine to combat it. The blood-film was found positive for aestivo-autumnal parasites; and the Meinicke reaction was reported as two plus. The stool was reported positive for trichocephalus; the hemoglobin was only 60%; and the temperature, on admission, was 100°F.

Case II.—The negro had an ulcer on the dorsum of the right foot, and stated that his lesion was only of two weeks duration and that he had treated it with strong chemicals in the camp with the hope of effecting an early cure at home. His ulcer was a little smaller than the size of a silver dollar. The Meinicke reaction showed a double plus; the thick blood-film was negative for malaria; the hemoglobin was 70%; and the urine and stool were negative.

TREATMENT AND COMMENTS

On entrance to the Hospital, the Meinicke tests were done at once; and, when the laboratory showed a double plus positive in each case, intensive treatment was begun immediately with mercury inunctions, potassium iodide in increasing doses, and bismuth salicylate injections.

After the ulcers failed to show any response to antisyphilitic treatment, it was suspected that we might be dealing with dermal leishmaniasis. In Case I (mestizo), after several examinations of stained smears from the ulcer, the characteristic Leishmania tropica organisms were found; but in Case II (negro) a number of smears all proved negative for Leishmania.

As the ulcer which remained persistently negative for Leishmania resembled so closely the one in which the organism was found, and as the two cases were so similar clinically; we treated the negative case precisely like the one which had been found to be positive. This treatment was as follows: first, 3 c.c. of a 1% solution of antimony and potassium tartrate was administered intravenously; two days later, 4 c.c. of the same solution were injected in the same manner;

again two days later, 5 c.c. were injected; and a fourth injection of 6 c.c. was given after another interval of two days. Neither patient showed any untoward effect from this medication; and the disease responded so rapidly to the treatment that the ulcers were almost entirely healed at the time of the fourth injection. The mestizo received quinine and plasmochin for his malaria infection during the same period that the injections of the tartar emetic were being given. Both patients were discharged on the twenty-first day after their admission to the Hospital.

YAWS—CASE REPORTS

O. T. Brosius, M.D., D.T.M. & H., F.A.C.P

United Fruit Company Hospital

Almirante, Panama

Yaws is quite an uncommon disease in the Panama Division; and in the past five years only 12 cases have been treated.

The raised crusted lesions of the four patients who presented themselves to our outpatient clinic this year were so typical that I thought it worth while to briefly report the cases.

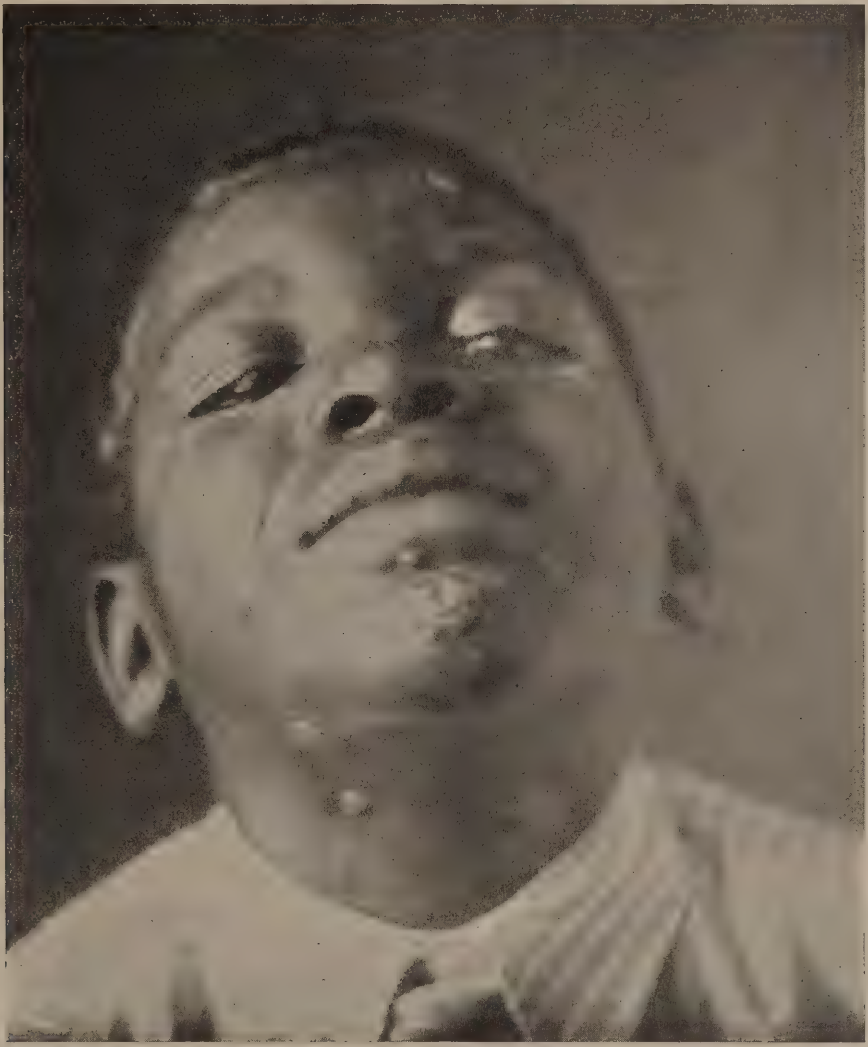
Case No. 1 was a negro boy, 11 years of age. He stated that the condition began, two weeks before application for treatment, as tiny papules; and that they grew rather rapidly until they presented the appearance shown in the photograph. No other members of the family were affected. In addition to the papules, the boy was suffering also from a severe arthritis of both elbow joints which disappeared almost completely after the first injection of neosalvarsan.

Case No. 2 was a mulatto girl, aged 18. She stated that she was the only one in her family who suffered from this condition and claimed that the disease began as itching papules three months before she applied for treatment. The physical examination was negative in all other respects.

Case No. 3 was a negro girl, aged 10. She showed typical secondary lesions, of one month's duration, on her face. Upon physical examination she was found negative for symptoms of any other disease and stated that she was the only member of her family who suffered from this malady.

Case No. 4 was a mulatto boy, 2½ years of age. The condition was first observed about three weeks before he came to the clinic. The lesions were on one leg and both arms, and on the prepuce. An older brother was alleged to have had symptoms of the disease at the same time, but has not yet appeared for treatment.

Spironemata pertenue were found in smears from cases 2, 3 and 4; but none were found in case #1. The diagnosis in the latter case was made from the appearance of the lesions which, as the accompanying photo shows, were typical of yaws—furthermore, the Meinicke test in this case, as in the three other cases, was three-plus positive.



TYPICAL LESIONS OF YAWS

All four cases responded satisfactorily to the routine treatment of three doses at weekly intervals of intravenous injections of neosalvarsan.

MICROFILARIA NOCTURNA—CASE REPORT

WALTHER JANTZEN, M.D.
Truxillo Railroad Company Hospital
Puerto Castilla, Honduras

The occurrence of microfilaria in Central America, especially in Honduras, is very uncommon. This case, found this year in Puerto Castilla, is the first one within the past 6 years to appear in our hospital though we have searched for microfilaria in all suspicious cases. On account of its rarity, it is reported below.

History.—W. S., a negro 22 years of age, entered the hospital on account of an accident occurring to him while working on a fruit train as a brakeman. He recently arrived from Puerto Cabeza, Nicaragua, where he had worked for almost two years. He was born in 1907, in Port Limon, Costa Rica. With the exception of a four months trip to Colon and Panama City in 1924, and the above mentioned two years in Nicaragua, he had spent his past life in Port Limon. His parents were born in Jamaica.

Physical Examination.—Very well developed male, without any signs or symptoms of filaria infection. The blood showed a large number of microfilaria—especially in the hours from 12 p.m. to 4 a.m. The diagnosis of microfilaria nocturna was confirmed by Professor Fülleborn, of Hamburg. Treatment was not administered, on account of the patient's good condition and the known ineffectiveness of treatment.

CHAGAS' DISEASE IN PANAMA—REPORT OF THREE CASES*

JOHN W. MILLER, Pathologist,
Hospital Santo Tomas and
Gorgas Memorial Laboratory
Panama, R. P.

More than two decades have elapsed since Chagas' disease, or American trypanosomiasis in the human being was first discovered in Brazil by Dr. Carlos Chagas[1] (1907) and later (1909) reported by him. Since that date, a few cases of what appeared to be the same disease have been reported from time to time in other parts of the Western hemisphere. This may indicate either a slow spread of the disease or a better knowledge of the clinical manifestations and greater

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use of the laboratory as an aid in diagnosis. It is likely that the geographical extent of the disease is much greater than has been previously suspected; since it is found usually in children, and the period of time that parasites can be demonstrated in peripheral blood films is relatively short thus making a diagnosis by this means largely a matter of chance.

Geographical Distribution:[2]—Cases have been recorded in Brazil, (Provinces of Minas Geraes, Sao Paulo and Goyaz), in Venezuela (states of Trujillo and Miranda), in Argentine (Tucumen and Jujuy), in Peru, and in Salvador.

Trypanosoma cruzi, or trypanosomes resembling it, have been found in bugs (*Triatoma* and *Rhodnius*) in the Argentine and in California but they are said not to transmit the disease to man in these regions.

Robertson[3] reports *T. cruzi* (1929) in an opossum captured near Tela, Honduras, C. A. It seems strange, with cases reported both below and above Panama, that no cases have been previously discovered in Panama or the Canal Zone, particularly in view of the fact that vast numbers of routine blood film examinations have been made in the hospital, dispensary and field services. The first case reported here is from the service of Dr. Rodolfo Arce of the Hospital Santo Tomas. It was discovered purely by chance in the routine examination of blood films for malaria. The other two cases were discovered by the Gorgas Memorial Laboratory while conducting a blood film survey for malaria in the basin of the Chagres river. All of the cases came from the village of Aguas Buenas or its immediate neighborhood. This village is located on the new Madden Dam Road near the Canal Zone boundary. The first patient lived about two miles from the village and about 50 yards from the Madden Dam Road. The other cases are members of a family that lives in Aguas Buenas. The homes of the patients are of the typical, rural, native type consisting of palm leaf roofs and cane walls with a dirt floor; the sleeping quarters being in the attic of the house on split bamboo or board ceiling.

CASE No. 1:—(Hospital Santo Tomas Case 111463).—E. H., a female infant of Panaman parents, aged 18 months, was born in San Francisco de la Montana, near Santiago de Veraguas and had lived for the previous two months on the Madden Dam Road near Aguas Buenas. She was admitted to the Hospital Santo Tomas, November 28, 1930, with a diagnosis of acute gastroenteritis. The history of the illness could not be obtained as no member of the family has visited the hospital since the child was admitted. The child was poorly nourished and poorly developed. The facial expression was dull and mask-like. The scalp was covered with a lot of dirty gray crusts and numerous pustules. The skin of the entire body was covered with scars, apparently the result of old insect bites. The eyes were normal. The thyroid gland showed no evidence of enlargement. The posterior cervical glands were large and hard and were somewhat more enlarged on the left side than the right. The left axillary and both inguinal sets of glands were palpable but were not so large as the cervical sets. The heart and lungs were normal. The abdomen was distended, pendulous and thin walled. A small umbilical hernia was noted. The spleen could not be palpated.

The temperature on admission to the hospital was 100° and it has since remained between 96.4° and 98.8°.

The pulse was 120 on admission and has remained between 100 and 130.

The respiratory rate has remained between 20 and 30.

Electro-cardiographic examinations showed no variation from the normal.

Laboratory Examinations:—Carlos de Seda of the Santo Tomas Hospital Laboratory, while examining a thick blood film of the child on December 1, 1930, found eight trypanosomes. These parasites varied in number in the blood films but reached a maximum of 296 per thick blood film on the thirteenth day after admission and then gradually diminished in number until they disappeared from the peripheral blood films on the twenty-eighth day after admission. The films for the past three months have remained negative for trypanosomes.

Blood Count:—Hemoglobin, 30 per cent; red blood cells, 1,600,000; color index, 0.93; leucocytes, 9,000. Differential count of the leucocytes: polymorphonuclears, 58 per cent; small lymphocytes, 20 per cent; large lymphocytes, 3 per cent; large mononuclears, 7 per cent; eosinophils, 12 per cent.

One estivo-autumnal gamete parasite was found.

The blood Wassermann test was negative.

A slight trace of albumen was the only variation from the normal that was found in the urine.

There was a heavy infestation of the stool with *Ascaris lumbricoides* and a light one with *Trichocephalus trichiurus.*

Treatment:—No specific treatment directed at the trypanosomiasis. After a vigorous treatment for the intestinal parasites the patient showed a steady general improvement.

CASE NO. 2:—(Hospital Santo Tomas case 115922).—T. R., a female child of Panaman parents, aged 2 years, was born at Aguas Buenas and has lived there continuously except for the second six-months period of her life which she passed in the city of Panama. This patient was admitted to the service of Dr. Jose M. Nunez in the Hospital Santo Tomas on March 9, 1931, with the diagnosis of Chagas' disease. The past history was negative except for the record of occasional attacks of fever and the passage of worms in the feces.

Physical Examination:—The child was well developed and nourished; and its facial expression was bright.

Numerous scars, apparently from old insect bites, were found on the arms and legs.

The thyroid gland was normal.

The axillary and inguinal lymph nodes were slightly enlarged.

There was a slight clear discharge from the eyes and nose. The lungs were normal.

The heart rate was 120 and slightly irregular; and a systolic blow was recorded. The abdomen was pendulous and soft, and there were no masses. The spleen was non-palpable. The temperature ran a normal course with a range of 97.2° to 99°. The pulse averaged 100. The respiratory rate averaged 24. There were no physical signs of disease other than those shown by laboratory findings. Electro-cardiographic examination was normal.

Laboratory Examinations:—Joseph J. Romanchek, of the Gorgas Memorial Laboratory found a trypanosome in the blood film taken from this child on March 3, 1931. Since that date one or two have been found in routine hospital examinations.

Blood Count:—Hemoglobin, 65 per cent; red blood cells, 4,330,000; leucocytes, 9,200. Differential count of the leucocytes: polymorphonuclears, 67 per cent; small lymphocytes, 23 per cent; large mononuclears, 5 per cent; transitionals, 3 per cent; eosinophils, 2 per cent.

No malaria parasites were found.

The urine was normal.

The stool was positive for *Ascaris lumbricoides*, *Strongyloides stercoralis* and *Trichocephalus trichiurus*. Light infections were indicated.

Treatment:—No specific treatment for trypanosomiasis was instituted.

CASE No. 3:—(Hospital Santo Tomas Case 115923).—J. R., a male infant of Panaman parents, aged 6 months was a brother to the second case. He was admitted to the service of Dr. Jose M. Nunez at the Hospital Santo Tomas on March 9, 1931, with the diagnosis of Chagas' disease. The past history was negative except for attacks of fever and the history of passing worms in his stools. *T. cruzi* was found in blood film during a malaria survey by Joseph J. Romanchek. This child was born in Aguas Buenas and has lived there continuously.

Physical Examination:—The child was well developed and nourished. Its facial expression was normal.

There were many scars over the body and extremities, suggestive of old insect bites.

The thyroid gland was normal.

The right cervical lymph nodes and the inguinal lymph nodes were moderately enlarged.

There was a slight discharge from the eyes and nose, and a cough of mild degree.

The heart was normal.

The abdomen was pendulous and soft, and contained no masses.

The spleen was non-palpable.

The temperature was 96.4° to 99°.

The pulse was 90 to 120 per minute.

The respiratory rate was 22 to 30 per minute.

Electro-cardiographic examination was normal. There were no physical signs of serious illness.

Laboratory Examinations:—Since admission to the hospital, the blood films have shown one or two trypanosomes in each thick film.

Blood Count:—Hemoglobin, 60 per cent; red blood cells, 3,820,000; leucocytes 8,200. Differential count of the leucocytes: polymorphonuclears, 65 per cent; small lymphocytes, 27 per cent; large mononuclears, 4 per cent; transitionals, 2 per cent; eosinophils, 2 per cent.

No malaria parasites were found.

The urine was normal.

In the stool many ova of *Ascaris lumbricoides* were found.

Treatment:—No specific treatment for trypanosomiasis was given.

MORPHOLOGY OF THE TRYPANOSOME:—The trypanosomes found in the blood films of all three cases were morphologically similar to *T. cruzi*, and tissue sections of the heart muscle in an animal infected with the parasite showed a typical localization of leishmania forms.

A detailed report will be made at a later date by the staff of the Gorgas Memorial Laboratory; where research work is in progress regarding an entomological survey of the local area where these cases were found, as well as a study of the disease in wild and domestic animals.

SUMMARY

(1) Three cases of Chagas' disease are reported, found for the first time in the Republic of Panama. All came from one focus in the basin of the Chagres River.

(2) The trypanosomes found in the three cases are believed to be *T. cruzi*.

(3) The trypanosomes disappeared spontaneously from the peripheral blood films, without the action of any specific drug, in the course of a few weeks. No opinion will be ventured regarding the final outcome of the attacks in these three children.

(4) The symptoms and physical signs of Chagas' disease presented by these cases were essentially negative.

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MULTIPLE VERRUGA-LIKE NODULES ON THE SKIN—CASE REPORT

Walther Jantzen, M.D.

Truxillo Railroad Company Hospital

Puerto Castilla, Honduras

In 1924, Weiss observed a case in our hospital with multiple nodules of the skin similar to the lesions found in verruga peruana. The case was published in detail by da Rocha Lima in the "Zeitschrift fuer Schiffsund Tropenkrankheiten, 1925." During the year 1930, I had the opportunity to see another case of skin eruption which resembled Weiss' case in all details. The likeness was clinically so striking that I at once remembered the description and the pictures of it and recalled the advice of the author to record all similar cases in order to assist in the efforts to determine the etiology and the geographical distribution of verruga peruana and related or similar skin eruptions.

Case Reports

The case reported by da Rocha Lima was a young well-developed Honduranean, with a large tumor (about the size of the fist) located on the back in the area corresponding to the 3rd and 4th lumbar vertebrae; and with numerous wart-like nodules scattered over the entire body. The tumors had developed within a few weeks. The large tumor was of spongy consistency, and of red color with nodular surface. It showed a tendency to bleed.

The results of the microscopic examination of the tumor are described by da Rocha Lima as follows:

> "The tissue is formed partly of compact cell-masses, partly of wide channels with extremely thin walls. The areas with the vascular structure take a much larger space in the tumor than the compact parts which are situated at its base. The latter parts have a striking likeness to the corresponding areas of verruga Peruana. They consist of the same large, succulent spindle-cells lying in all directions, often showing mitosis. These cells go over from the surface of these masses into the endothelium. The endothelial nature of the tumor formation is also pronounced with distinctness here. Of special interest, besides this, is the finding of intracellular bodies in the protoplasm of these angioblasts, proliferating as in a tumor; bodies which are not to be differentiated from bodies described by Mayer and da Rocha Lima in verruga Peruana. They are conglomerations of different sizes, consisting of very spheric formations similar to fine granulations or to tiny micro-organisms, which may belong, according to these authors, to the group of Strongyloplasmata or Chlamydozoa. They are found to a great extent in cells which do not show symptoms of degeneration. These organisms can be stained only with the method of Giemsa or Levaditi. The conglomerations of these round, or slightly oval shaped and pinkish bodies mostly form a rather sharply limited part of the otherwise light blue protoplasm of the otherwise unchanged spindle-cells. In some cells the nucleus is mechanically pushed against the periphery. While the compact and sarcoma-like parts of the nodules of verruga Peruana are completely like those of this case, the edematous parts of connective tissue are absent in the latter. The wide blood vessels of the sur-

face of the tumor, with their thin walls, are, however, more numerous, wider and of thinner walls. The spongy quality of the greater part of the tumors predominates in this case while, in the tumors of verruga material, the angiomatous character of the superficial parts is vague and distinctly recognizable only in a small peripheral zone."

My case, which is reported below, is not very different.

History.—Salvadoranian, 41 years of age, lived in our district for about 10 years. He had always been healthy. He entered the hospital on June 9th, 1930, for treatment of a tumor on the extensor surface of the left leg which he had noticed first about 2 months previously. The tumor was growing slowly, and showed a tendency to bleed. For about the preceding six weeks, he had observed several other tumors on the skin of the left arm and hand. There was no feeling of illness before nor during the eruption.

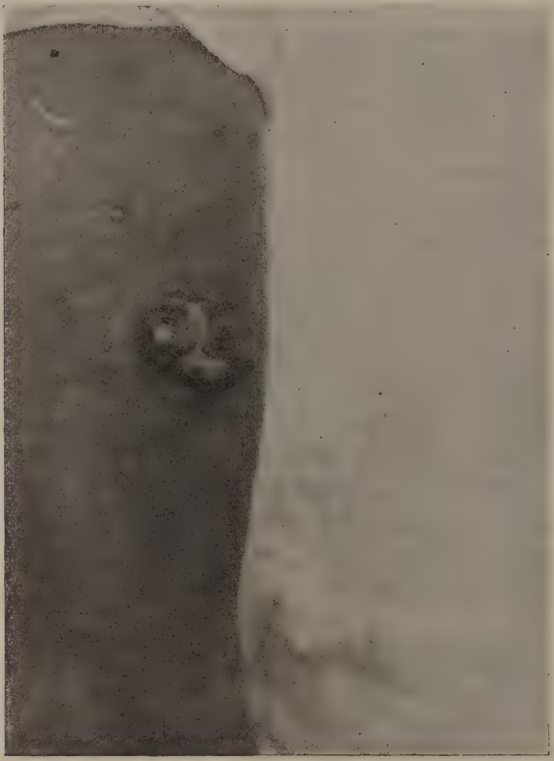

FIG. 1

Examination.—The patient was a well-developed, middle-aged native, in very good general condition. The right arm was missing; he had lost it in a machete fight. The chest was normal. The spleen was enlarged two fingers below the costal margin. There was a tumor the size of a large walnut on the extensor surface of the left leg about 20 cms. above the patella (Fig. 1). The tumor was of a nodular shape, of red color, and prone to bleed. The tumor was situated in the skin and showed no adherence to the muscles nor aponeuroses below. It was surrounded by a few flat nodules of wart-like appearance, being smaller than a pea and of a pinkish color. Tumors of the latter type and size were found also on the face, the back, the left arm, and the left hand. A tumor above the right eye (Fig. 2) and another one on the left middle-finger were larger and more protruding, and were covered with a black crust. The Meinicke test was negative; the stool showed ova of uncinaria and trichocephalus dispar. White blood count was 10,800; differential: small and large lymphocytes, 60%; mononuclears, 1%; neutrophiles, 39%. The temperature was normal.

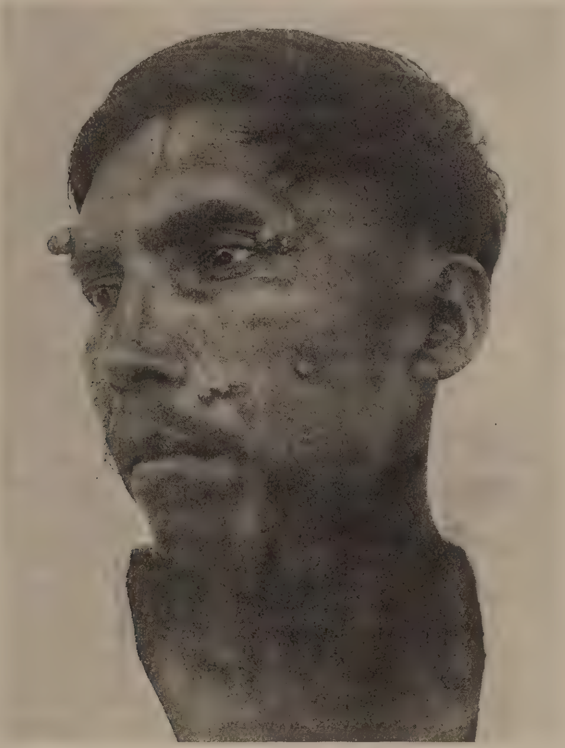

FIG. 2

Treatment.—The large tumor of the left leg and the tumor above the right eye were removed under local anesthesia. The patient was discharged on the 26th of June, 18 days after admission, without having shown any other pathological symptoms than those noted above. He was told to return in six weeks; but he has not returned up to the present date, and we have been unable to trace him.

Material from the tumor was sent to Dr. Nauck of the Tropical Institute, Hamburg. I quote his report as follows:

> "The examined tissue consists in the main of proliferated spindle-shaped cells. Partly they are arranged in circumscribed areas and are situated between fascicles of fibrous

tissue, partly they penetrate the whole subcutaneous tissue as diffuse heaps of cells. These cells are packed closely together and are crossed in all directions. They have a protoplasma and their nuclei are large, clear, poor in chromatine and of roundish-oval shape. Between these cell-masses of doubtless endothelial character there are visible areas, in which are found capillary lumina lined by endothelial cells. The endothelial cells pass directly into the proliferated tumor-like tissue. In many places the growth of the irregularly arranged capillary lumina is more pronounced, while there are in other places only compact masses of tissue. In the whole, the compact proliferation of tissue predominates, in some places strongly reminding one of sarcoma. Surrounding the nests of spindle-cells the connective tissue is edematous, infiltrated with lymphocytes and more or less loose in texture. Also within the proliferated cell masses there are areas which are edematous and infiltrated with cells. There are no elastic fibers within the nests of spindle-cells, while they are preserved in the neighboring fibrous tissue and apparently pressed aside by the proliferating cell masses. Hemorrhages or infiltrates with leucocytes are not present. Eosinophiles are missing, however there are relatively numerous mast-cells scattered in the tissue. The epidermis is not substantially changed. The papillae appear somewhat flattened, the horny layer is missing, the epidermis is on the whole somewhat thinned.

The histological features correspond to those of a proliferation of blood vessels and endothelia, as they have been described in verruga and other diseases similar to verruga (Pseudo-verruga, telangiectatic granuloma, angiofibroma cutis contagiosum). The histological character of the growth is that of a capillary hemangioendothelioblastoma, the formation of arterial lumina within the nests of cells make it evident that we have to deal with a case corresponding histologically to the first case recorded from Honduras and described by Rocha Lima. Our effort was to demonstrate also in this case the intracellular bodies found by Rocha Lima. But we did not succeed in doing so, notwithstanding the examination of numerous specimens stained with Giemsa or Levaditi. However, the absence of intracellular bodies, which is also observed in material from genuine verruga Peruana as well as in the tissue from experimental verruga of monkeys, is not a deciding factor against the acceptance that both cases are alike if the histological features are otherwise the same. On the other hand, the presence of intracellular bodies does not prove by any means the identity with the verruga Peruana, from which the verruga, or pseudo-verruga respectively, observed in Honduras already differs distinctly epidemiologically, as da Rocha Lima emphasizes."

Comments.—Our case is unusual and rare from the clinical and pathological standpoint. I believe we are justified in putting it into the same category as the case published by da Rocha Lima. The histological features are almost the same. There are proliferating spindle-shaped cells forming compact nests similar to spindle-cell sarcoma; there are other areas which have the character of an angioma. The only difference is the absence of the intracellular bodies. The clinical similarity is striking. Both cases show tumors of the skin which are more or less prone to bleed. Figures I and II show better than any written description the characteristics of the tumors; and a comparison with the illustrations published by da Rocha Lima will show the similarity of the growths in the two cases. There were also no changes in the general conditions of both patients; at least not as long as they were under the observation of the hospital staff.

To which category does our case belong?

There are several possibilities. The histological character of the growth is that of a capillary hemangioendothelioblastoma. Dr. F. B. Mallory of Boston City Hospital, to whom we also sent specimens of the case, diagnosed the growth as such a tumor, with metastases. But the same features are shown also in the tumors of verruga peruana and in the angiofibroma contagiosum tropicum described first by Bassewitz.

Though the tumors macroscopically and microscopically resemble those of verruga peruana, there is no similarity from the epidemiological and clinical stand point. Within a period of approximately 6 years, there were only two cases observed among our laborers; and it would seem quite improbable that such cases would have been overlooked, as all our laborers are under careful medical supervision. Our case differs clinically, also, from verruga peruana, as we saw no symptoms of a systemic illness—even if we consider it as a fact that verruga peruana and oroya fever are two different diseases, and that even the fever stage before the eruption of the verruga is not typical but is the expression of a mixed infection, there are, according to Strong, still some prodromal symptoms before the eruptions appear in verruga peruana. These were absolutely absent in our case. Our patient was worried only by the tumor on his leg, on account of its tendency to bleed; and there was apparently no history of a general infection at any time.

What is said above with regard to the epidemiology pertains also to the angiofibroma contagiosum. Besides, the Bassewitz' tumors are more frequently encountered on the face, neck and genital organs than on the extremities; and they very frequently also affect the various mucosae.

It is obvious that an exact diagnosis is somewhat difficult. There are several reasons which especially account for it: It was impossible to follow the course of the disease. We do not know if the tumors, not removed by the operation, disappeared; or whether there were any relapses or recurrences; or even whether the disease terminated fatally or not. An autopsy would probably have cleared the diagnosis. Verruga or verruga-like nodules are not found with regularity in the internal organs. We probably would have found metastases in other organs or even a primary tumor as a cause of the skin eruption, if the tumors in our case belonged to the malignant growth group.

Unfortunately, animals were not inoculated with the tumor tissue. A positive implantation would have led us to a diagnosis of verruga, as it is transmissible to animals.

Chlamydozoa-like bodies were not found in our case; but it is impossible, as mentioned above, to depend on the presence or absence of these bodies for the diagnosis as such evidence is still of hypothetical value.

Considering the facts mentioned above, a definite diagnosis could not be made. We must leave the question open as to whether these tumors belong to the group of malignant growths or should be classified as verruga-like growths.

FIBROMA, MOLLUSCUM FIBROSUM OR VON RECKLINGHAUSEN'S DISEASE— CASE REPORT

RICARDO AGUILAR, M.D.

United Fruit Company Hospital

Quirigua, Guatemala.

A native male, 51 years old, well known in his locality on account of his interesting skin condition, was admitted to the hospital for treatment of E. A. Malaria. Photographs and a brief report are submitted on account of the rarity of the disease.

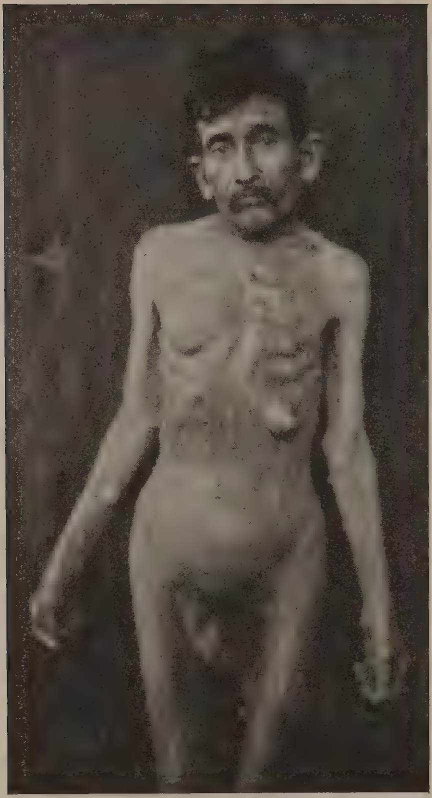

FIG. 1

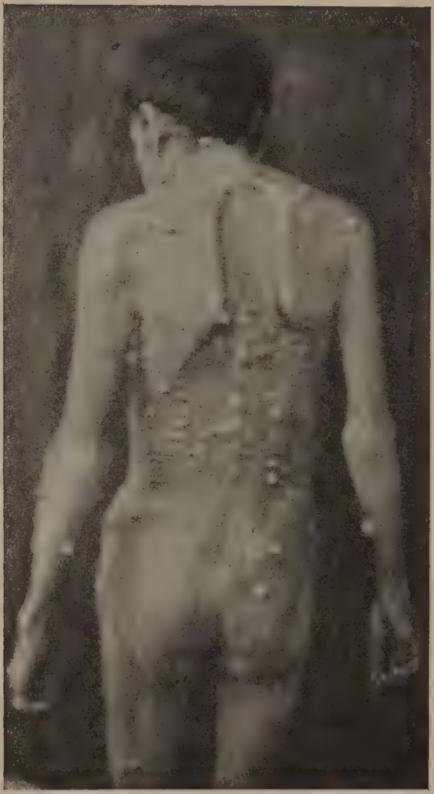

FIG. 2

The patient stated that he had had multiple skin tumors since his earliest recollection. In the course of the years new tumors have appeared and older ones have become enlarged. None of the nodules are painful, but all are sensitive to heat and touch. The larger ones appear to be more sensitive than the smaller.

On palpation, the consistency of the largest tumors resembled that of lipomatous tissue, while the smaller appeared to be fibrotic in character.

The most numerous and largest tumors are on the anterior surface of the thorax and abdomen (Fig. 1), and do not seem to follow nerve courses.

On the patient's back, (Fig. 2) the tumors are numerous; but are smaller than in front, and harder in texture. There are many small tumors on the inner surface of the arms and forearms, distributed mainly along the course of the musculospiral nerve; while tumors are not so numerous on the lower extremities, and none is apparent below the middle of the calf of either leg. They are absent from the scalp, scrotum, perineum, and the area within three inches of the anus. The face and neck show a few small tumors.

The patient is a hunchback; and his head is drooped to the right, which causes him to look always toward his left side. The skin of his face has a few patches of chloasma. Examination of his chest and abdomen reveals no pathology, with the exception of slight enlargement of the spleen.

The patient's mental capacity is poor. He is illiterate and inclined to sluggishness. A full family history cannot be obtained, although he is sure that neither his mother nor father had a similar disease. As far as he knows, he has had no offspring.

The aetiology of von Recklinghausen's disease is unknown; and, up to the present time, medical treatment has proved unsatisfactory. There is little literature* on the subject.

LIPOID HISTIOCYTOMA—REPORT OF CASE†

JAIME DE LA GUARDIA, M.D.

United Fruit Company Hospital

Banes, Cuba

M. D. CARDENAS PUPO, M.D.

Of the Histo-pathological Laboratory of the University of Havana

Following the work of Aschoff, Landau and Kiyono on the reticulo-endothelial system; and that of Jong and Siegenbeck von Henkelom, de Anitschkow, etc., which have shown the rôle it played in lipoid metabolism; a new line of research has been started by histo-pathologists in an attempt to show the importance of this system in the genesis of xanthomatous tumors. There are, notwithstanding, those who believe that the infiltration of the tumor with lipoid substances is a secondary process, and consequently classify such tumors as fibrous hemangio-endothelioblastomas, etc., according to the histological picture.

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* A case of von Recklinghausen's disease was reported by Dr. A. Cuff Lushington, Kingston, Jamaica, B. W. I., in the Eighteenth Annual Report, United Fruit Co., Medical Dept., 1929, p. 181.

† Originally published in "Revista de Medicina y Cirugia de la Habana," Nov. 30, 1930.

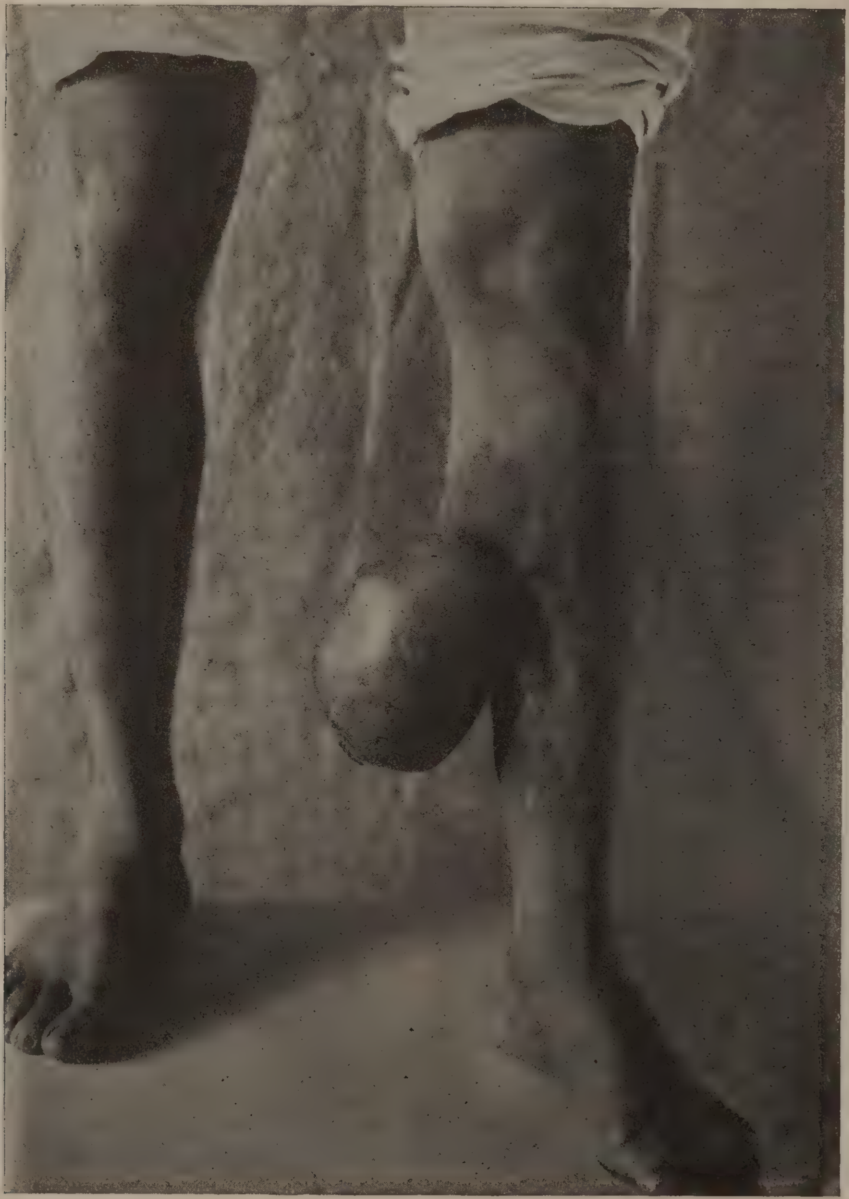


Fig. 1

We shall leave for a future and more careful study, the discussion of those theories; and shall limit ourselves at this moment to the presentation of a case of xanthoma which we have called a *lipoid histiocytoma*—a name which we think better adapted to it than that of "Xanthelanized Histiocytoma," first used by Levy.

Case Report.—Pastor Toirac, Cuban, 30 years old, complained of a pedunculated tumor in the middle third of the left leg which began some ten years ago as a small nodule and which has since continued to grow to its present size (See Fig. 1). A month before he appeared for examination there was a slight ulceration of the tumor, causing a left inguinal adenitis which rapidly improved following adequate treatment. Otherwise the history is negative; and the patient stated that he has always been healthy and has never suffered from icterus, diabetes, etc. (?).

The tumor has a semi-hard consistency, and a yellowish tinge; and is situated superficially, there being no intimate connection with the sub-adjacent muscular plane. Resection of the tumor being indicated, it was done easily because of its superficial location.

Examination of micro-sections coloured with silver carbonate (which is ideal in these cases), and complementary stains for lipoids, show a slow growing blastoma which is formed of round cells. These cells are of large size, of weak protoplasm and heavily charged with lipoids; (cholesterin and lecithin principally), and the round, central nucleus has an intense affinity for silver carbonate. In simple stains the carbonate of Rio-Hortega gives a beautiful hive-like picture of the cellular protoplasm. It is easy to follow, in successive stages, the varying appearance from normal histio-cytic cell to those above described; and, from these, to the monster type described by Touton.

Blood vessels are abundant, with thick walls and hyaline plaques. (Could the latter be of cholesterin origin?)

Stroma is scarce and has the same characteristics as the vascular walls. That is, this tumor is generated at the expense of cells which clearly show phagocytic properties, and which accomplish this purpose through impregnation of the protoplasm with lipoid granules.

The yellow tint and other characteristics compel its inclusion in the old group of xanthomas. Its histio-cytic genesis places it with the histio-cytomas; and the lipoid nature of the phagocytized granules justifies the name of "Lipoid Histiocytoma" with which we head this report.

MERCUROCHROME IN THE TREATMENT OF KNEE JOINT INFECTIONS

Ricardo Aguilar, M.D.

United Fruit Company Hospital

Quirigua, Guatemala

The frequency with which we meet different types of infection of the knee joint, and the tedious care required in obtaining good results, has prompted the following report.

In recent years the author has treated many types of acute arthritis with effusion, whether the effusion is serofibrinous or purulent, with mercurochrome intravenously and with local injections of mercurochrome solution into the infected joint.

For about three years all cases of arthritis in the knee joint, with effusion and with all types of metastatic infection (except tuberculous), have been treated with injections of mercurochrome into the joint, with passive movements of the extremity; and excellent results have been obtained.

General treatment has also been instituted—i.e., iodides, salicylates, mercury, antiseptics of genito-urinary tract, etc., etc., have been administered, depending on the etiology of the arthritis.

Most of the cases in which I have used this treatment were gonococcal infections, sequelae or complications in acute chest conditions, and pyorrhea infections; but a few of them have been of syphilitic origin, and one was consecutive to what appeared to be an old appendicular abscess.

The gratifying effects obtained in the treatment of these cases (about 25) justifies us in continuing this procedure. All of them, with one exception, showed splendid results with restoration of normal function of the joint. The exception was a case which failed to recover complete extension of the knee.

TECHNIQUE OF THE INJECTION

After preparing the operative field with tincture of iodine and alcohol, an injection of about 1 c.c. of $1\frac{1}{2}\%$ novocaine, is given at the point where the paracentesis is to be made. An 18-gauge needle is introduced into the joint and adapted to a 20 c.c. syringe, and the fluid is aspirated. Before all the joint fluid is withdrawn, the needle is left in place and 5 to 20 c.c. of 2% solution of mercurochrome injected after some of the fluid is again drawn into the syringe, in order to make sure that the solution is being injected into the joint cavity.

The mercurochrome solution should be prepared with sterile precautions; and the same preparation is used for intravenous injection. The amount used depends on the severity of the case, the age of the patient, his idiosyncrasy for mercury, and the number of injections given. Immediately after the first injection, the knee is exercised for about five minutes by a gentle passive movement. A second injection is given on the second or third day, and the time and extent of the movements should be increased. After the first injection, the fluid withdrawn subsequently is stained red from the previous injection of mercurochrome.

It is a wise precaution to keep the extremity in extension, in order to avoid as much as possible the vicious flexion position of the extremity so common in this particular type of case.

Usually, after the third injection, the patient himself begins active movement of the joint; and, in my experience, more than four injections are rarely necessary for a complete recovery.

REPORT OF CASES

(*One of each of the types treated*)

CASE No. 1.—35 years old, negro, admitted in October, 1930. *History of Present Illness:* Received a blow over left knee three days before admission; has had gonorrhea for last two months. *Complete Abnormal Conditions:* Left knee inflamed and painful, and intracapsular fluctuation. *Genitalia:* dysuria, and urethral discharge. *Laboratory Report:* blood negative for malaria; urine, pus + +; stool, uncinaria; urethral smear, positive for gonococci. *Diagnosis:* Gonorrhoeal urethritis, and gonococcal arthritis with effusion. *Clinical Report:* Temperature ran between 100° and 103°F. for nine days, ascending after each injection of 15 c.c. of mercurochrome solution. Patient got four injections, one every other day, and passive movements of the extremity were done. After the 10th day, his temperature was normal; and active movements of the joint were encouraged, and executed without any pain. Diuretics and urinary antiseptics were administered during the period of treatment. Solution of potassium chlorate 4% was given by mouth for two days, to control the slight mercurial stomatitis produced by the mercurochrome. When the patient was discharged from the Hospital, he had complete movement of his knee.

CASE No. 2.—29 years old, Salvadorean, admitted November, 1930. *History of Present Illness:* Complained of pain in both wrists and left knee for 10 days; had gonorrhea many years ago, and a chancre about a year ago. *Complete Abnormal Conditions:* Pain on pressure over external and internal margins of the tibiae; left knee swollen and tender, and with complete lack of movement; spleen enlarged two fingers below the costal arch. *Laboratory Report:* Urine, positive for albumin, hyaline casts and pus +; stool, ascaris ova; blood, negative for malaria and strongly positive for Meinicke reaction. *Diagnosis:* Syphilitic arthritis with effusion of the knee joint. *Clinical Report:* His temperature was normal on admission, but after each injection of mercurochrome solution, it became elevated to between 100° and 102°F. The patient was given four injections of 10 c.c. of 2% solution, one every other day, and passive movements. Mercury and iodides were administered orally. After 14 days treatment, the patient had full control of the movements of his knee and was quite active.

CASE No. 3.—50 years old, male, Spaniard, admitted September, 1930. *History of Present Illness:* Ill for three weeks, with pain in left knee, ankle and right wrist. *Complete Abnormal Conditions:* Left knee swollen and tender, and with considerable effusion; coated tongue, and severe pyorrhea alveolaris; teeth were loose, and all had pockets of pus. *Laboratory Report:* Urine, positive for albumin, casts and pus; stool, blood, and Meinicke test, negative. *Diagnosis:* Pyorrhea alveolaris and acute arthritis with effusion. *Clinical Report:* Temperature ran between 100° and 102°F. for 13 consecutive days. All the patient's teeth were extracted; antiseptic mouth wash was prescribed; and four injections of 20 c.c. of mercurochrome solution given every other day. Owing to a mercurial colitis, potassium chlorate solution was given orally. Salicylates were given orally. Passive movements were given daily; and the patient got full active movement of the extremity after the 42nd day of treatment.

CASE No. 4.—43 years old, native, admitted December, 1929. *History of Present Illness:* Had been having cough, fever, rachialgia, anorexia and weakness for five days; and pain developed in the right knee the day before admission. *Complete Abnormal Conditions:* Coated tongue; subjective pain and lack of motion in right knee; lungs showed dullness of the left base and subcrepitant râles; heart—tachycardia, and pericarditis with effusion. *Laboratory Report:* Urine positive for albumin, casts and pus; blood, negative for malaria; Meinicke reaction, negative; stool, positive for ova of tricocephalus and uncinaria. *Clinical Report:* Temperature ranged between 102° and 104°F. for the first week. On the 6th day the right knee became inflamed, painful, and swollen. Paracentesis of the joint was done; withdrawing 120 c.c. of purulent fluid, which was positive for pneumococci. 20 c.c. of mercurochrome solution were injected; but the extremity was not exercised. Three days later 90 c.c. of fluid were aspirated, and 15 c.c. of mercurochrome solution were injected; and passive exercises of the knee begun. Two days later, 60 c.c. of fluid were withdrawn and 10 c.c. of mercurochrome solution injected; and movements increased. Three days after, 14 c.c. of fluid were withdrawn and 5 c.c. of mercurochrome injected. His temperature in the second and third weeks fluctuated between 99° and 102°F., with evening rise. During the fourth week, the temperature began to subside; and at the end of the fifth week it was normal. The patient was given cardiac tonics, salicylates and iodides. After the sixth week of treatment, the lungs and heart were normal, and the knee had only a very slight lack of extension.

CASE No. 5.—65 years old, North-American, admitted on October, 1930. *History of Present Illness:* 10 days before admission, and after a ride of about 18 miles on horse-back, he had had acute pain in appendical region. He had to lie down for a day; and then was taken on a chair for 18 miles to the railway, and thence to a City Hospital. After a few days rest, he came to Quirigua Hospital. On his day of admission, the patient had a very distinct and painful mass in the McBurney region. Temperature was normal. Blood pressure: 126 systolic and 72 diastolic. *Laboratory Report:* Urine, positive for albumin, casts and pus;

stool, positive for blood, pus, and mucus; blood, negative for malaria; white blood count, 12,250. *Clinical Report:* Patient was kept under observation, as a bed patient, with ice-bags applied over the appendix. Retention of urine occurred on the third day; and catheterization of the bladder was necessary, twice daily, for 8 days. Prostate was very much enlarged. At that time, the appendicular mass had not been reduced in size; but was less tender on pressure. Prostatectomy was performed under spinal anaesthesia. Patient showed uneventful recovery until 10 days after operation, when the left knee began to pain and the temperature rose to 101°F. Two days subsequently the knee became swollen and moderate effusion developed. *Diagnosis:* Arthritis of left knee, with effusion. Appendicular mass was smaller, and there was no tenderness in that region. Withdrawal of fluid; and three injections of 5 c.c. each, of 2% mercurochrome solution, every other day, and passive movements of the leg; were sufficient to effect a complete recovery.

CONCLUSIONS

1. Mercurochrome injections of 2% solution into the knee joint is a safe procedure.
2. Local injection of mercurochrome in the knee joint is extremely helpful in controlling many types of local infection.
3. Passive movement of the joint contributes to a satisfactory result.

"TENO-SYNOVITIS CREPITANS" OF THE WRIST AMONG CANE CUTTERS

P. S. MALARET, M.D.

United Fruit Company Hospital

Banes, Oriente, Cuba

Acute thecitis or acute teno-synovitis of the extensor tendons of the wrist is usually an occupational disability arising as a result of excessive use of the part or following such strains as lifting heavy weights; and is seen commonly among those who are not accustomed to the particular form of exercise involved or who overtax the hand following a long period of rest. It has been reported as a common condition among pianists, organists, and stenographers; and bricklayers are said to be unusually susceptible to teno-synovitis of the left hand, in the Extensor ossis metacarpi pollicis and Extensor brevis pollicis tendons.

Among "cane cutters," such inflammation in the extensor tendons of the hand is quite common at the beginning of the cane-cutting season; and consequently is known by the local name of "cane cutters wrist." The number of cases diminishes gradually, as the season progresses and the laborers become accustomed to the work. It is more apt to occur among men who have not cut cane before; but it is also seen among old cane cutters, following the long period of rest from this particular form of exertion. It is usually observed in the right hand, with which the cane-cutting knife (*machete*) is held; but also occurs occasionally in the left hand, with which the pieces of cane are thrown to the accumulating heap. In both instances the continuous, jerky, throwing back of the hand causes an irritation of the sheaths of the tendons with the outpouring of an inflammatory exudate, evidenced by swelling of the dorsum of the wrist; pain, which is referred upwards; and a characteristic creaking sound upon flexion and extension of the hand, which has given the name of "teno-synovitis crepitans" to this stage of the disease. This stage is followed by the pouring out of a serous effusion which causes the pain and crepitus to disappear.

The tendons which seem to be usually involved or which seem to have the greatest inflammatory reaction when other tendons are also involved, are the Extensor carpi radialis longior and Extensor carpi radialis brevior. These two tendons, which have one common synovial sheath while passing under the posterior annular ligament of the wrist and which are inserted at the bases of the second and third metacarpal bones respectively, would seem to be subjected to the greatest strain in the peculiar movements of the hand involved in cutting cane. The Extensor communis digitorum and Extensor indicis, which have a common synovial sheath and are mainly involved in the extension of the fingers, seem to be next in the degree of severity and frequency of their inflammatory reaction. The three Extensor pollicis tendons involved in the extension of the thumb would come next; while the Extensor minimi digiti and Extensor carpi ulnaris, lying towards the inner border of the wrist, never seem to become involved. However, it must be taken into consideration that these cases seek treatment almost immediately after they first notice the pain and inflammation, as the condition comes under the Workmen's Compensation Law; and there is seldom any opportunity for progressive involvement of all the tendons. The inflammatory condition rarely goes beyond the "crepitus" stage in which practically all the cases are first seen.

There is nothing exceptional about the treatment; and it consists simply in resting the hand by the application of a firm bandage, and the use of some analgesic to relieve pain. In some particularly severe cases a splint is used during the first forty-eight hours to prevent flexion of the hand; but free movement is allowed as soon as possible, and most cases return to their work within one week. Up to now we have never seen a second attack in the same individual.

SECTION IV

SPINAL ANAESTHESIA

L. M. DRENNAN, M.D.
United Fruit Company Hospital
Santa Marta, Colombia

The literature in recent years has contributed in a great measure to the scientific advancement and increasing popularity of this form of anaesthesia in surgical practice.

It has been my privilege to use this method in 948 cases covering a period of three years. This has given me an opportunity in a variety of operations to observe its many advantages over other forms of anaesthesia previously used here.

It is true that in the past there have been waves of enthusiasm for this method; mostly accompanied by failures, accidents due to bad technic, toxic drugs, improper dosage, and finally, as Dealy states, with a lack of understanding of the mechanism by which the vascular tone is maintained and the circulatory centres assured.

For the present, while we have not reached the millennium in anaesthetic practice, spinal anaesthesia when properly administered approaches most closely the perfect anaesthesia. All of this has been reasonably controlled by a standardization of drugs and their dosage, and by proper technic. Naturally this does not mean for its successful accomplishment merely the penetration of the subarachnoidean space with a certain measured quantity of drug. Certain details must be taken into consideration to make it the success it really deserves.

It is admitted, of course, that not all patients are ideal subjects; but this should not detract from its general value. It is a known fact that to try to standardize humans is an impossibility; and consequently, in all surgical procedures of recognized merit today, the selection of cases, attention to detail, peculiarities of temperament, etc., constitute individual problems for the surgeon. Established methods in this field have been the triumphs of repeated trial and error, but no one would consider throwing them into the discard because of an occasional failure. So, too, spinal anaesthesia has stood the test of time; and the confidence gained in recent years by refinement of drugs and technic has unquestionably demonstrated its safety and practicability beyond all measure of doubt.

The most important factor we have to contend with in this field is the control of the fall in blood pressure. Unfortunately, owing to the nervous mechanism involved, this feature is unavoidable. To assist in counteracting this condition the Trendelenburg position, called the sheet anchor in spinal anaesthesia, should be used almost as a routine. With this, the heart is sustained and disasters from cerebral anaemias avoided. In other words, the patient veritably bleeds into his own blood vessels unless placed in this position.

While there are many preparations employed in spinal anaesthesia; I have used exclusively novocaine crystals, put up in hermetically sealed ampules. The fact that they are in a vacuum is an added advantage in preventing deterioration of the preparation.

The technic used here is as follows: A high enema is given the night before operation. Cathartics are not used, unless the patient has been under treatment in the hospital or at home for several days. It is a well-known fact that, following a spinal injection, rapid gastro-intestinal peristalsis, due to the unopposed action of the vagus, is at once produced. Hence cathartics in any form should not be given. If this principle is not followed, the surgeon can expect the annoyance of intestinal incontinence at a time when it is least desirable.

Following the result of the night enema the patient is given one or two sleeping tablets—I prefer luminal—insuring a restful sleep; and the patient awakes the next morning refreshed and better prepared for the ordeal ahead. Morphine and atropine, and ephedrine, are given separately as routine hypos a half hour preceding the operation. Many of our patients, who are able, walk to the operating room; and the spinal injection is given in the sitting position, with the feet hanging over the side of the table. The patient is instructed at the same time to bend forward, resting hands or elbows on knees. This, whenever possible, I consider superior to the lateral recumbent position recommended by some authors. The facility in this posture for entering the subarachnoidal space unhampered by bungling efforts, slow drop taps, and resulting post-operative backaches common to the latter, cannot be over-emphasized.

After painting the area to be punctured (usually over the second or third lumbar interspace), with iodine followed by alcohol; a skin wheal is produced, with an injection of a 2% novocaine solution. The needle is advanced slowly, infiltrating the tissues down to the interspinous ligament; about 2 c.c. in all being used. The novocaine crystals are shaken from the ampule by the nurse into a small sterile medicine glass, to which are added ten drops of a 3% ephedrine solution.

Also, to avoid the possibility of post-operative backaches, a 20 gauge chrome-plated spinal puncture needle is used; and preferably one with a bevel of 45 degrees. When possible, this puncture should follow the route of the needle previously used for local infiltration. Such a puncture on entering the dura produces a miniature trap door closed by intradural pressure when needle is withdrawn. (Pitkin.)

With experience, one generally knows immediately when the space is entered; as it is readily recognized by a snapping sensation or released resistance imparted to the practiced hand. The greater the fluid pressure the more readily is this recognized. On removing the stylet, it is very important that a good flow of fluid should follow. This is allowed to drip into the glass containing the novocaine and ephedrine. Ordinarily about 4 to 6 c.c. are sufficient. The stylet is then reintroduced; and the solution is mixed, and drawn into a 10 c.c. Luer syringe. This solution is injected slowly, accompanied by revolving movements of the syringe and needle. A small square of adhesive is placed over the site of injection, and patient lowered on the table.

As novocaine solutions diffuse rapidly, it is not necessary that the patient be placed immediately in the Trendelenburg position. The lapse of a short time is preferred to allow the solution to become fixed. One is guided in this respect by the nature of the operation to be performed as well as the size of the dose. Small doses—50 mg.—for use in short operations often do not require a change in position.

Complete anaesthesia should take place in about ten minutes, which is the time usually consumed in draping the patient.

In a major case, especially of the abdominal type, we break the foot of the table at the level of the patient's knees. In this way the Trendelenburg position is more easily maintained without the need of shoulder braces. An etherizing screen frame is finally adjusted to the table at the patient's head.

The dosage and amount of fluid withdrawn vary with the character and scope of the operation contemplated. The more fluid withdrawn the greater is the tendency to post-operative headache; and hence a minimum amount of fluid, 4 to 6 c.c., to insure perfect and lasting anaesthesia is always advisable. On the other hand, I have noted that the withdrawal of larger amounts of fluid produces a wider range of anaesthesia. This is undoubtedly due to the rapid diffusibility of the anaesthetizing agent. There is an advantage gained in this way when long operations are anticipated, especially in the upper abdominal quadrants; as less shock is produced and anaesthesia is sustained without resort to ether. To me, this is more vital to the patient and surgeon than the possibility of post-operative headaches.

In our earlier operations we used 120 mgs. If a perfect anaesthesia can be obtained in this way, one can often carry out to a successful conclusion most major operations. I found later that 150 mgs. were equally as safe and much preferred in upper quadrant operations. This insures a more prompt nerve block, less shock, and the abolishment of rigid belly wall so difficult to close at termination of operation. It also greatly minimizes pain and vomiting produced by peritoneal and visceral traction.

Vomiting occurred in about one-third or more of our cases. Sometimes this only amounted to a severe nausea or temporary gagging. This is not alarming, and lasts but a few minutes. Only in a few cases was the vomiting continuous; and at no time should it cause the surgeon any worry. The mechanism of this is not clearly understood. Increased gastric peristalsis is a certain factor; but I am not prepared to state how much lowered vasomotor tone enters into it.

I must mention in this connection, by way of comparison, that a majority of our patients are considerably below par physically. Blood pressure in tropical regions is generally lower than elsewhere. When anemia, bad diet, poor living conditions, chronic malaria, and intestinal parasitic infestation, are added to this, one can visualize a state of lowered vitality unequalled in temperate climates.

The pulse rate of such patients during operation with spinal anaesthesia will frequently drop twenty beats in a majority of cases. In extreme cases, especially when ephedrine is not used, it will drop much lower, with a corresponding fall in blood pressure.

The nurse usually checks up on the pulse; and, so long as fairly good volume is maintained and the patient's condition is apparently satisfactory, there is no necessity for taking blood pressure readings. Assuming that the patient is a good risk on coming to the operating room, I have no hesitancy in stating that they can be dispensed with entirely.

Ordinarily, if disagreeable symptoms occur, one can usually expect them to come on early in the operation. In the great majority of cases where they occur, they are not lasting; and, when once the patient settles down, smooth sailing can be expected thereafter. The fact, therefore, that we have not had one real fatality speaks well for the safety and practicability of this method.

There is no operation below the costal margin that cannot be performed with spinal anaesthesia; nor is there any objection to, or ill effects from, the number of times it may be given in the same case. In one case, a girl of 11 years with an infected hip, it was given at least five different times; and, in a case of rectal stricture complicated by chronic ulcerative proctitis and multiple fistulas, seven times. There also have been a number of cases where it was administered two or three times. One cannot help but recognize its advantage over ether in such cases.

On the other hand, one should keep in mind certain so-called contraindications. Patients in a state of shock from any cause, and those with advanced peritonitis, are obviously dangerous risks. Intestinal obstruction or perforation, and strangulated hernias, theoretically should be included in this list; although I am not so sure, as will be explained later.

Naturally, advanced peritonitis with associated feeble heart action accompanied by a remarkably lowered vasomotor tone and the pooling of blood in the abdominal cavity can only be aggravated by spinal anaesthesia. One case in this category was sufficient to justify this conclusion. There was little hope in this case that operative interference would be of any help to the patient. He was very toxic and restless, with a weak thready pulse; and pain and distention were most intense. Almost immediately following the spinal injection given at this time, in the lateral recumbent position, he became quiet and marvelled at the disappearance of his pain. In a few seconds he was dead. This is the only fatality, and should not reflect in the least on the method. He would have died anyway.

The danger of perforations in intestinal obstructions has been referred to. From the standpoint of increased peristalsis this seems plausible, altho I have never seen it occur. Conversely, after all other means to overcome a condition of this kind have failed, spinal anaesthesia is the pivotal point in determining whether such an obstruction is complete or only partial. I observed this in two cases, thus avoiding the necessity of operative interference. Obviously one must be prepared to operate in such cases within a short time where failures by this method occur.

In strangulated hernias one must not be disillusioned even though, apparently, reduction by this method has been effected. The released loop of gut, probably gangrenous, may disappear from view and cause considerable anxiety on the part of the operator in having to fish around in the abdomen to locate it. Where one sees the case early and is sure that the contents of the sac have not reached a state of devitalization, the complete relaxation produced by spinal anaesthesia materially aids in reduction and prevents the usual serious complications. This often makes it possible to postpone the operation until a more favorable time.

Similarly, in gunshot wounds of the abdomen spinal anaesthesia is said to be contraindicated because of the soiling of peritoneum induced by undue peristalsis. Yet, when one considers the advantages of an otherwise silent belly; no bulging of intestines, so often encountered in inhalation anaesthesia; the ease and rapidity with which intestinal injuries can be located, isolated with a minimum of packs, and repaired; the shortening of the operation and reduction of shock; any danger which otherwise might be ascribed to its use is greatly minimized. Ordinarily, in most intestinal perforations soiling by faecal matter has already occurred; and certainly the struggling under inhalation anaesthesia does not lessen the possibility.

When ephedrine is not used, one should not be deceived by a lessened degree of bleeding during the operation. This is brought about, as one would expect, by a lowered vascular tone. On the reestablishment of normal tone, blood clots are sometimes swept away with resulting hemorrhage.

Anyone disregarding the possibility of this and likewise the precaution to ligate potential latent bleeders, courts trouble. I have noted the comparative frequency of post-operative skin haematomas and other more serious bleeding along fascial planes as a consequence. While none of these is fatal; the possibility of inviting infections, retardation of healing, and prolongation of hospital days, are annoyances which the surgeon should by all means strive to avoid. All oozing from denuded areas, often following pelvic inflammatory operations, should be recognized as potential dangers and packed. In anticipation of such complications, posterior colpotomy for drainage purposes as an initial procedure is the logical safeguard. By using ephedrine hypodermically as well as intraspinally, this danger is diminished. On the other hand, there are claims that the use of ephedrine does no good and may even cause harm. These contentions are based on the fact that it stimulates vaso-motor nerves only in the unanesthetized region, which would only tend to increase pooling of blood in the blocked-off area. Fortunately, pooling per se does not occur to such an exaggerated degree. I frankly believe that this condition merely represents a slowing down of the current. It does not actually stop. Consequently, the added general and prolonged stimulus, as produced by ephedrine, prevents the development of just such a condition; and, at any rate, I have not found such a condition sufficiently serious to contraindicate the use of this drug.

Where one desires immediate results, whenever the necessity arrives, adrenalin as a stimulant during operation is preferred to ephedrine. The latter, however because of its sustained action, is much superior. In recent months, since we began the use of ephedrine as a routine procedure before operation, the occasions where adrenalin was needed to sustain a failing circulation in a certain number of our cases during operation have been definitely reduced if not entirely eliminated. In fact my recent observations have been that, by the addition of ephedrine to our armamentarium, the blood pressure had been so well stabilized that we have found it advantageous whenever possible to discard the use of the Trendelenberg position. Incidentally, this has not only added to the comfort of our patients; but has resulted also in a lessened degree of vomiting during the operation, in a number of our cases.

In obstetric practice there is no more satisfactory method of anaesthesia than this. I refer now, of course, to the treatment of complications in this field. It does not endanger the child in any way; and, on account of the complete relaxation produced, much mutilation of the soft parts is saved the mother. I have used it in forceps operations, placenta previa, and versions. In the ease of performance of the various obstetrical maneuvers, the relaxation of a previously rigid or spasmodic os uteri, permitting the application of forceps with greater facility and the extraction of child with less effort compared to general anaesthesia, this method has much to recommend it. In breech presentations, all of this is especially true; where the danger of injury to the legs and arms of the child is reduced. Consequently we see less frequently the occurrence of those troublesome sequelae, cystocele and rectocele. I have not had occasion to treat eclampsia by this method, as the condition is very rare here; but think it would be distinctly advantageous, and would not hesitate to use it should the occasion arise.

In localities where trained hospital help is at a premium, spinal anaesthesia is of the greatest economic value. It is not only less expensive; but also speeds up the work in the operating-room. Many more operations can now be performed than formerly, in a specified period of time; and less assistance is required. In the early days, before this method was introduced, all of one nurse's attention was devoted to the anaesthesia.

The same may be said of the advantages of this method in isolated places, small hospitals, emergency work, and even in the jungle.

Old people stand spinal anaesthesia very well. Altho it has also been recommended in children, only one, a child of 11 years, was included in this series.

In only a few cases was it found necessary to restore a failing circulation with adrenalin during the operation. This occurred early in our series; but rarely does it occur now. Occasionally, patients fall asleep; and awaken only on being removed from the table at the completion of the operation, and sometimes not until they have returned to the bed. At times they become conversational which we do not discourage as it helps to distract the patient's mind from the operation. In tuberculosis or other respiratory affections, diabetes, bad kidneys, and other conditions contraindicating general anaesthesia, spinal anaesthesia can be used with the greatest comfort and satisfaction.

Post-operative complications such as headaches cause complaint occasionally and stiff necks, rarely. When they occur, they are not lasting. The few serious headaches were controlled, either by high magnesium sulphate enemas or by a withdrawal of about 10 c.c. of spinal fluid. I have never seen the latter fail, in the few cases in which resort to it was found necessary. Post-operative vomiting almost never occurs. This is a great advantage, as patients can take fairly large quantities of liquids almost immediately on return to bed. Consequently there is no dehydration from lack of fluids, and no suppression of urine; and elimination is good. Serious post-operative gastro-intestinal stasis, with its many attending evils, is a thing of the past. A certain amount of abdominal distention does occur; but it is always controlled easily by simple saline enemas or an occasional dose of pituitrin. Urinary retention requiring catheterization is also much reduced. However, I have found that operative trauma of whatever nature, performed on pelvic viscera, frequently produces this condition regardless of the anaesthesia.

One case in this series was troubled with strabismus, which came on in about ten days following operation. It disappeared in a like period. Headache was not present in this case.

Two cases complained of a partial loss of sensation and muscular movements of one leg. This was more noticeable after the patients were up and walking around. It was observed, at the time of the spinal injection in these cases, that they complained of pain radiating into the extremity almost immediately. This pain lasted a few days after return to bed, but at no time was it severe in character. No permanent disability resulted. I am sure perfect technic would have avoided this complication.

As previously pointed out, there are many differences of opinion regarding the use of spinal anaesthesia. Despite some adverse criticism it is rapidly gaining in popularity. Obviously, variations of technic only tend to confuse or discourage the uninitiated; and make it more difficult, if not impossible, for them to grasp the essentials of a method which, because of its safety, effectiveness, and ease of administration cannot be questioned.

I have endeavored to describe as briefly and plainly as possible the procedure carried out here; and, so long as the general outline of the technic in most of its essentials is followed, minor modifications will make very little difference.

Should this presentation stimulate further interest, it will have accomplished its purpose.

MARJOLIN'S ULCER—A CASE REPORT

J. M. de los Reyes, M.D.
United Fruit Company Hospital
Banes, Cuba

This disease was first described by Marjolin, in the twenty-first volume of the Dictionnaire de Medecin, in 1828. He called it "warty ulcer," having observed the condition, twice on the sole of the foot, once on the leg, and once on the groin.

Such ulcers are the result of epithelial degeneration at the site of an old cicatrix, arising in the dermis and slowly becoming malignant. According to Hawkins (1835) a little wart or warty tumor appears first in the old cicatrix. It is dry; and is covered by a thin cuticle which soon becomes moist and practically ulcerated, and from which a thin, offensive, and semi-purulent fluid is exuded. At this stage, there is no pain. In the second stage, the growth of the tumor is rapid, the warty appearance being in some measure lost and a more solid substance projecting from the diseased area. The tumor is very vascular and bleeds easily. In the final stage ulceration and sloughing takes place, alternately, with a great deal of pain. Metastasis is very late, because of the large amount of fibrous tissue which blocks the lymphatic channels.

Any injury which will produce a cicatrix may be considered as a predisposing factor of this disease; but I believe it is thought that a cicatrix from a burn is more apt to degenerate into a Marjolin's ulcer.

Smith gives a table showing the period which elapsed between the infliction of the original injury and the appearance of the tumor, in the cases reported up to that time. The interval ranged from 5 to 61 years, with an average of 20 years.

W. W. Keen, in 1907, designated such a condition as an ulcer that has undergone malignancy. He has seen several cases.

During the healing process of a wound, some epithelial cells may become buried in the granulation tissue; and these epithelial cells may become the matrix of an epithelial tumor, which may assume active tissue proliferation whenever conditions are such as to enhance its activity.

If there is an ulcer undergoing malignancy, as in the case here reported, the edges become hard and elevated. The granulations are harder and larger, and bleed more readily than healthy granulations; and assume a warty character or a cauliflower appearance. The neighbouring tissue becomes hard, due to the extension of the process; and at a very late date the regional lymph nodes may become involved. The callous ulcer, unlike the malignant ulcer, is sunk below the cutaneous level. When malignancy arises, it begins in the margin of the ulcer and spreads slowly but inexorably. Chronic simple ulcers are rarely tender, or painful; while malignant ulcers are associated with pain and induration. The pain is of a hot, scalding, or darting character. The discharge is profuse and foul.

Da Costa describes 2 cases arising from varicose ulcers of the legs.

Gross, in more than half a century of surgical practice, saw only three cases; in all of which the condition was so far advanced as to require amputation.

So far as I have been able to determine, this condition is very rare in Cuba.

TREATMENT

In the early stages, radium, X-Ray, electric desiccation, or surgical extirpation may cure the condition. In advanced cases where surgical intervention is refused, X-Ray or radium should be used to check the rapidity of its growth, reduce discharge and hemorrhage, and alleviate the pain. When amputation is decided on, it should be done well above the ulcer; and a careful examination of the regional lymph nodes should be made.

REPORT OF CASE

A. P., Cuban, colored, female, 49 years of age, moderately nourished, came to the Banes Hospital seeking relief from an old ulcer of eight years duration; stating that, during that time, she had had periods of improvement but never complete healing.

Family History. She did not remember what diseases she may have had in childhood; but assured me that, although she remembered having had typhoid-fever, variola, pertussis, and malaria, she "had always been in a fair state of health."

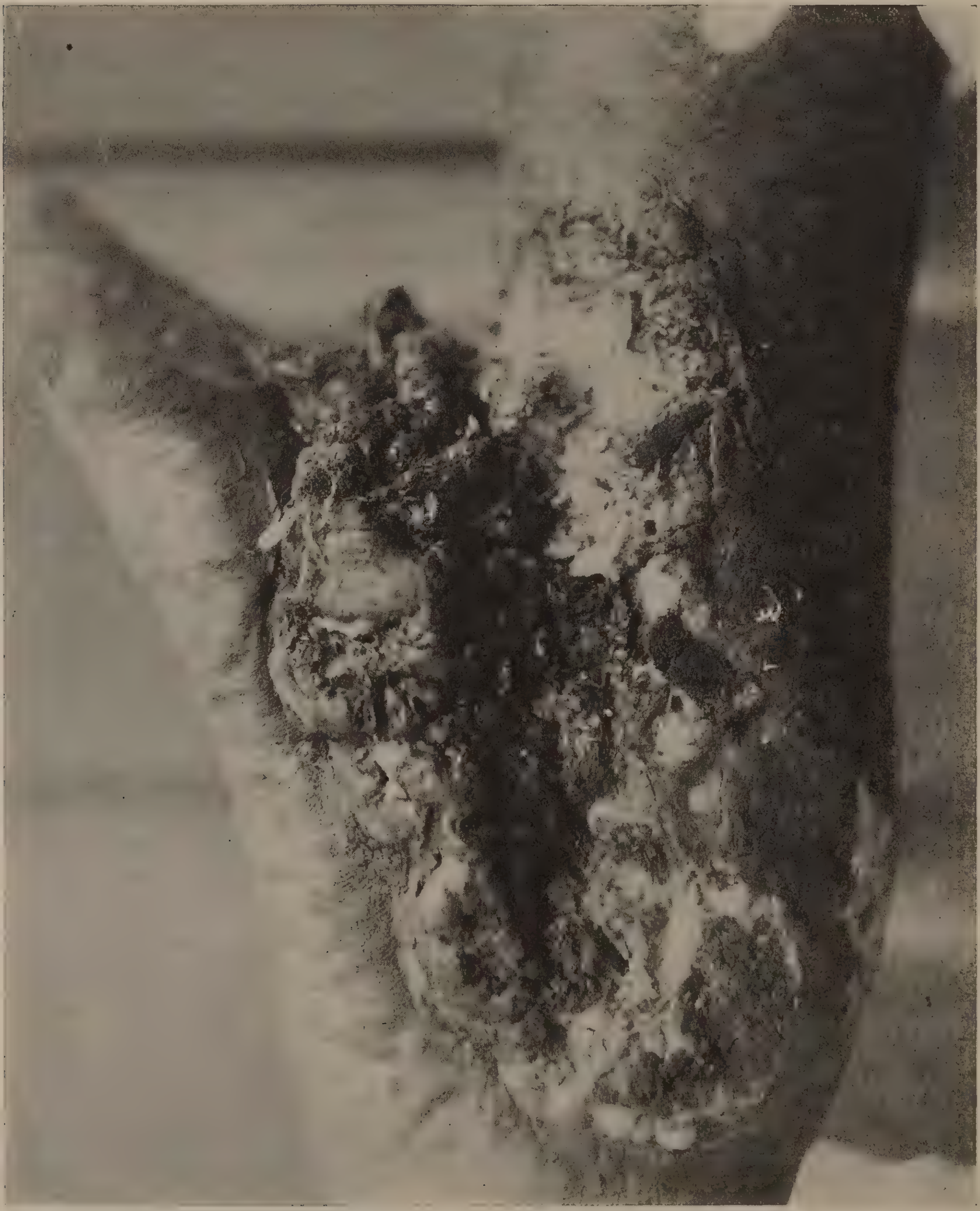
Past History. In 1920 she had her clothes ignited; and received second degree burns of hands, forearms and both legs, which lesions took about nine months to heal completely.

Present History. In 1922 a small growth appeared at the centre of the cicatrix over the lateral malleolus of the left ankle, which ulcerated rapidly and increased in size. Lately it had become stationary. She used all kinds of "home treatments" and ointments, without improvement. During the formation of the scars the left foot assumed the talipes-calcaneus position, until the toes were about an inch from the anterior tibial region. She went to see several doctors, but without any results. Eight months ago she noticed that there was a warty growth at the lateral margin of the ulcer, which was painful; and the discharge became profuse. As the condition did not improve and the pain persisted, she decided to enter the Hospital.

Physical Examination. Essentially negative, except for the extremities.

Upper Extremities. Scars over dorsum of both hands and forearms. No functional disability.

Lower Extremities. Right: small scar over inner malleolus at ankle. Left: extreme talipes-calcaneus of left foot. A large ulcer, about the size of a small saucer, covered the lateral side of foot and lateral malleolus, and extended to anterior, tibial aspect. The edges were irregular and ragged, with papillomatous incrustations, and appeared to be raised above the level of sound skin. The grayish floor, cauliflower-like in appearance, exuded a profuse, ichorous, and foul discharge. The floor of the ulcer was tender; but the surrounding tissue was not so, although it presented a hard consistency. Ankylosis of ankle joint was present. No apparent regional gland involvement.



MARJOLIN'S ULCER—ILLUSTRATION SHOWS EXTREME TALIPES CALCANEUS OF LEFT FOOT PRODUCED BY FORMATION OF THE ULCER

Laboratory Report. Blood: Meinicke's Turbidity Reaction, negative; W.B.C. 12,960; haemoglobin, 75%; R.B.C. 3,800,000; urine and feces, negative.

Treatment. Due to the advanced condition of the lesion and the consequent deformity, amputation was decided upon.

The leg was amputated below the knee. The operation performed was the modified circular incision with complete removal of the fibula as advocated by Dr. Da Costa. There was no gland involvement of the popliteal region. The patient had an uneventful recovery.

A piece of tissue sent to Dr. F. B. Mallory, Pathological Laboratory, Boston City Hospital, Massachusetts, elicited the following report.

> "*Microscopic examination* shows masses of cornifying epithelium, with delicate strands of stroma between them. The connective tissue at the base is infiltrated with numerous lymphocytes and some eosinophiles. The epithelium is growing moderately rapidly as shown by occasional mitotic figures. There is a slight tendency to invasion at the base.
>
> "*Microscopic Diagnosis.* A papillary type of epidermoid cancer with marked cornification and moderate chronic inflammation.
>
> "Recurrence unlikely. Prognosis favorable."

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LIPOMATA—CASE REPORT

J. M. DE LOS REYES, M.D.
United Fruit Company Hospital
Banes, Cuba

PRELIMINARY REMARKS

Lipomata are benign tumors of minor importance, to which very little attention is paid unless they mar the appearance of the individual or are so situated as to interfere with the normal functioning of the part involved. They may be congenital or acquired; and are further classified into fibro-lipoma, diffuse lipoma, xanthoma, etc., according to the presence of other tissues or the absence of a capsule. They are known to wander from their original site, and also to change their shape and size—this is in all probability due to gravity. They are most common in middle life, and are usually found in the subcutaneous tissue—most often in the dorsum of the extremities, shoulders, buttocks and back, although they may be found anywhere in the body. Usually they occur as single tumors, but they may be multiple and even symmetrical; and may be painful, as in Dercum's disease. Lipomata rarely degenerate into malignancy; but when they do, it is usually by a process of sarcomatous degeneration. These fatty tumors may ulcerate, or undergo metamorphosis of a calcareous or myomatous type; or, again, oily cysts may be found.

CASE REPORT

The present case is reported because of the size of the tumor and its very unusual location, although such tumors are frequently seen on the dorsal surface near the elbow. The patient, a white Cuban laborer, 22 years old, did not have free use of his left arm due to a large tumor at the bend of the elbow. Three years ago he noticed a small growth on the left arm just above the elbow joint, in its ventral aspect; and it increased in size until it prevented complete flexion of the fore-arm.

On examination, we found a large tumor mass (Fig. 1) about the size of a grape fruit in the anterior medial aspect of the left arm just above the elbow joint. It was doughy in consistency, and had a definite demarkation; was somewhat oval in shape, and independent of the biceps-brachii muscle; and was apparently encapsulated, as it was freely movable.

The patient was in very good physical condition. At operation a large lipoma, having a definite capsule, was removed. It was situated beneath the muscular aponeurosis, and had two projections—one between the insertion of the biceps tendon and the brachial artery and vein, and the other beneath the pronator teres muscle. These projections were firmly bound to the surrounding tissues.

The patient had an uneventful recovery and regained complete use of his arm.

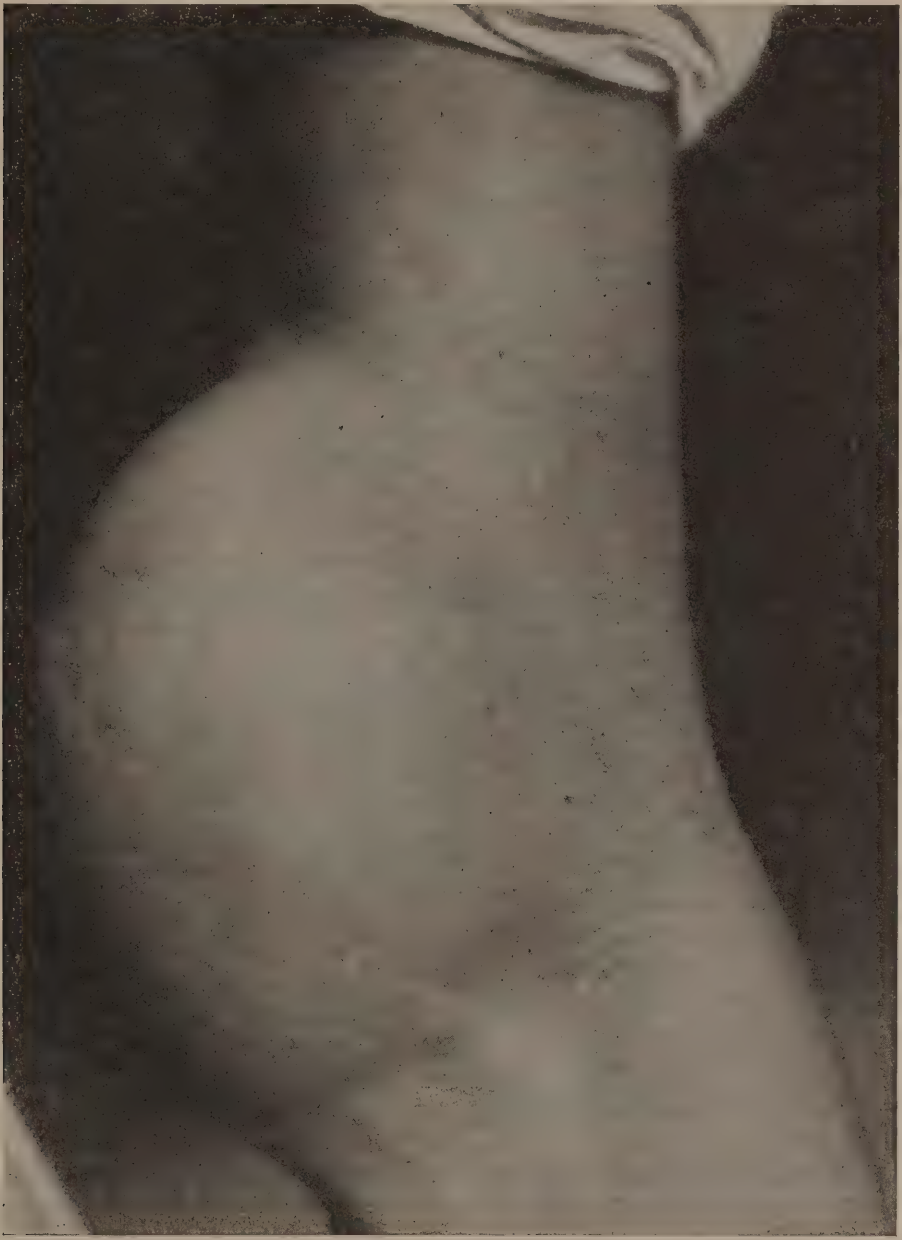


FIG. 1

INCOMPLETE INTESTINAL OBSTRUCTION—CASE REPORT

ALBERTO F. RUIZ, M.D.

United Fruit Company Hospital

Banes, Cuba

A male colored baby was admitted to the Hospital on September 3rd, 1930, and his mother related the following history:

That her baby, up to 4 days ago, had been healthy; and although artificially fed, he had never suffered from diarrhea nor any other gastric disturbance. Four days ago, in the evening, he took ill suddenly with a sharp pain in his abdomen; and it was so severe that the slightest pressure exerted on that area made him cry violently. Following this, the baby began to vomit. The vomit contained undigested milk and this condition persisted throughout that night. At the same time, the temperature rose to 103°F. Early next morning, a purgative was administered; but he vomited it. He had several scanty, watery movements, with some bloody striae; and vomited every time that food was given. That day he was seen by a Doctor in town; who diagnosed the case as an acute food intoxication, and prescribed some intestinal disinfectant mixture. Next day the abdomen became distended; while the bowel movements continued to be scanty and to contain bloody mucus. This day he vomited several times.

On admission we found a well-developed coloured baby, 6 months of age, with a temperature of 104°F.; pulse, very rapid and almost imperceptible; abdomen, very much distended. The mother showed a diaper containing a watery mucus evacuation in which there were no signs of feces. Peristalsis could be palpated and could be perceived visually. All food was discontinued, and a turpentine enema was given without result. During the night he passed some flatus.

The following day 2 enemas were administered, with 3 hours interval; and at the same time Tr. belladonna gtts. V were given t.i.d. In both enemas, a small amount of feces and much of flatus were expelled. During the night, $\frac{1}{4}$ c.c. of pituitrin by hypo was followed by an enema; but only mucus and blood were defecated. The abdomen was less distended; and, although his temperature was 105°F., the patient looked better, was more active, and took some food without vomiting it.

The following day the abdomen became distended again; and a saline enema was returned with mucus and blood. He had subsequently several similar movments. The patient looked more depressed, and peristalsis was more noticeable. In the evening, he had a motion with medium amount of blood in it.

By exclusion, the case was diagnosed as a partial intestinal obstruction in the ileocecal region; and an exploratory laparotomy was decided upon. The possibility of an intestinal intussusception was excluded, as palpation revealed no tumor and the rectal digital examination was negative. A median subumbilical incision was made. The peritoneal cavity was searched, first following the rectum from below upwards, and next exploring the sigmoid and descending colon. Failing to find anything abnormal in this area, the cecum was exposed and a very curious condition was found. First, we noticed a very free cecum and ascending colon; then, a long retrocecal appendix (4 inches) adhering to and encircling the cecum,

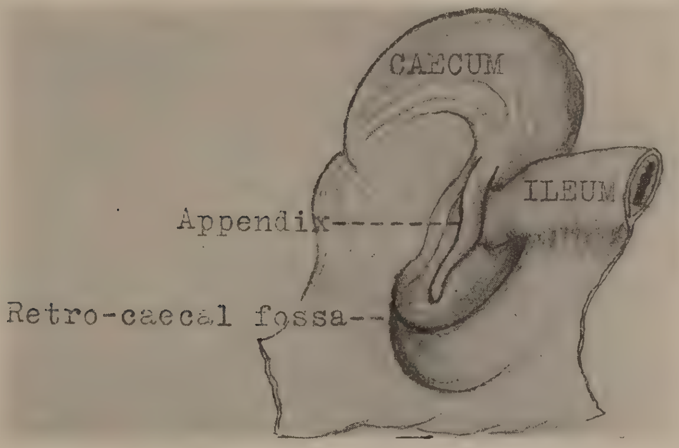


FIG. 1

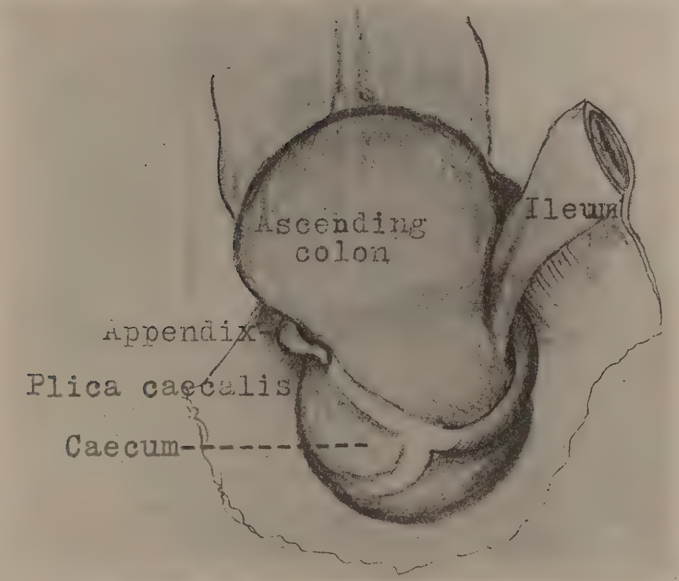


FIG. 2

thus strangulating it and including in this strangulation the ileocecal valve or junction. Immediately after the appendix was freed from its adhesions, the obstruction disappeared and the patient passed flatus and feces in large amounts while still on the operating table.

After the operation the patient gradually recovered; and his bowels moved regularly; and only now and then was some mucus noticeable. He was discharged as cured, on the 13th day after the operation.

The etiology of this intestinal obstruction can only be explained by a kind of intussusception motion, provoked by anomalous peristalsis, that pushed the cecum and ascending colon—in this case very movable and free—into the retrocecal fossa. The sliding motion carried the appendix, which was exceptionally long (4 inches), around the back of the cecum; and then the adhesions were established, causing the strangulation of the cecum and including the ileum in this strangulation. After the strangulation was freed, a constriction ring persisted around the cecum and ascending colon.

In Figure 1 (taken from Cunningham's Test-book of Anatomy) the retrocecal fossa is shown. The retrocecal fossa is present only occasionally. It is produced by the *plica caecalis*, a peritoneal fold which passes from the iliacus to the right lateral aspect of the cecum.

Figure 2 shows the condition found in the case reported.

CARCINOMA OF THE STOMACH IN A NEGRO OF 24 YEARS

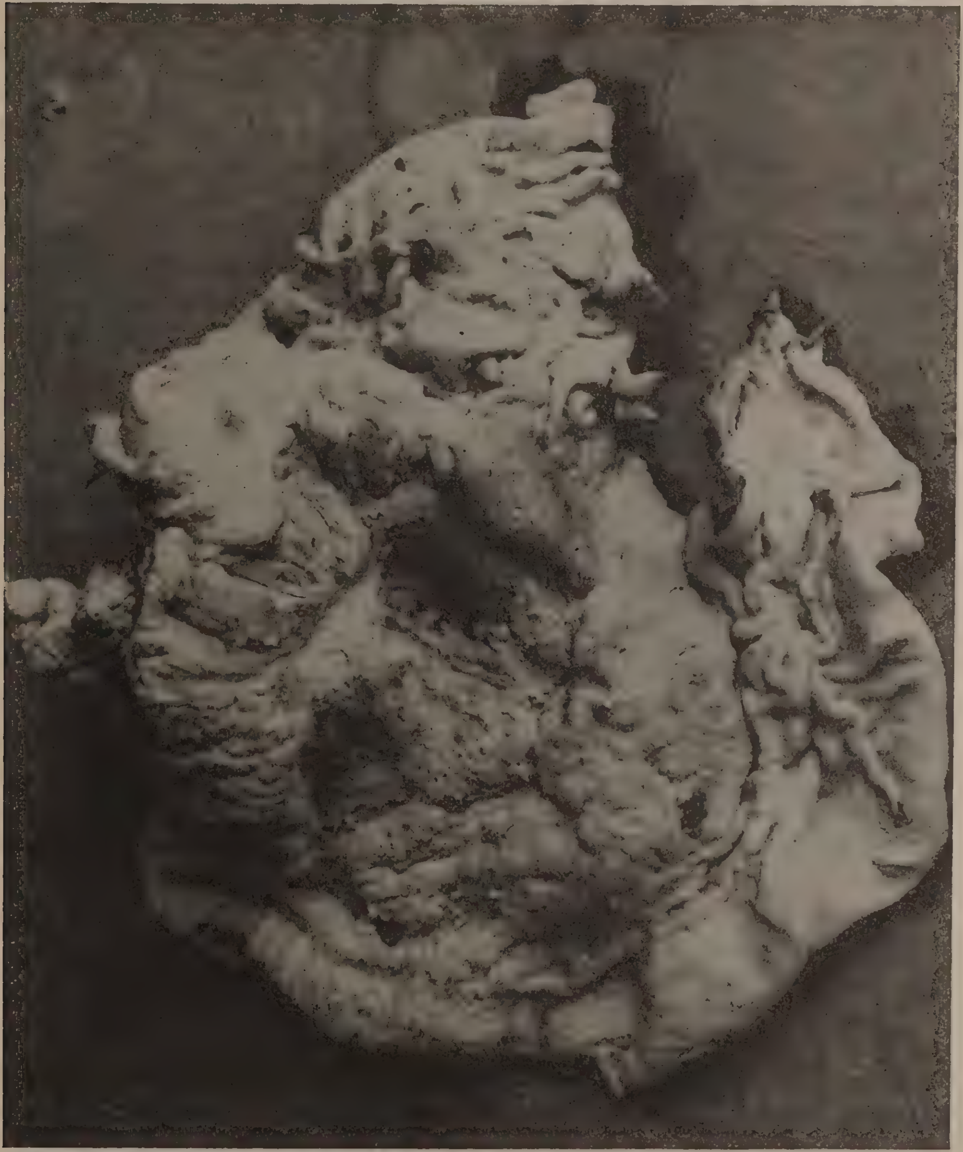
Jaime de la Guardia, M.D.

United Fruit Company Hospital

Preston, Cuba

Last year in this publication we reported a case of early carcinomatous degeneration of a gastric ulcer in which a partial gastrectomy has given very satisfactory results. The man is alive and well, and free from symptoms three years after the operation.

It is our purpose to report now an unusual case of an advanced scirrhous carcinoma of the stomach in a Haitian negro 24 years of age. There are several important features in this case: *First*, carcinomatous changes usually occur after middle age; while our patient was 24 years old. *Second*, the patient belongs to a primitive race among whom carcinoma is very rare. *Third*, the surgical indications, the technique employed, and the results obtained merit a separate discussion. I have no doubt that for many surgeons the exploratory laparotomy, revealing an advanced neoplasm involving more than two-thirds of the stomach, would have been ample reason to consider the case inoperable. The recent communication of Bloodgood,[1] however; which shows that a wide gastrectomy in these cases, although difficult and with a high mortality, has saved many lives; determined us to adopt this procedure. The operation consisted in resecting practically four-fifths of the stomach. In view of the small part of this organ left, we



SECTION OF STOMACH REMOVED WHICH COMPRISES ALMOST FOUR-FIFTHS

were confronted with the problem of not being able to perform a transmesocolic gastrojejunostomy; and naturally the only solution was to connect the stomach and jejunum with an anti-colic anastomosis, supplemented by an entero-anastomosis.

The immediate post-operative results of this procedure recommended by Balfour were most gratifying—more so, in fact, than in other gastrectomies in which we followed the classic Polya-Mayo's technique. There was no shock, no vomiting, no distention; and the patient was having semi-solids on the sixth post-operative day. However, he developed on the twelfth post-operative day a phlebitis of the right leg which required his staying in the hospital thirty days longer. He was finally discharged, weighing twenty-one pounds more than when he came in and free of symptoms, and with the recommendation that he return to the hospital for observation within a month. He came back once more two months later, when he showed unequivocal signs of recurrence and generalized carcinomatosis. He died of cachexia three weeks later and autopsy confirmed the clinical diagnosis.

CASE REPORT

Haitian negro, 24 years of age. Family and past history irrelevant.

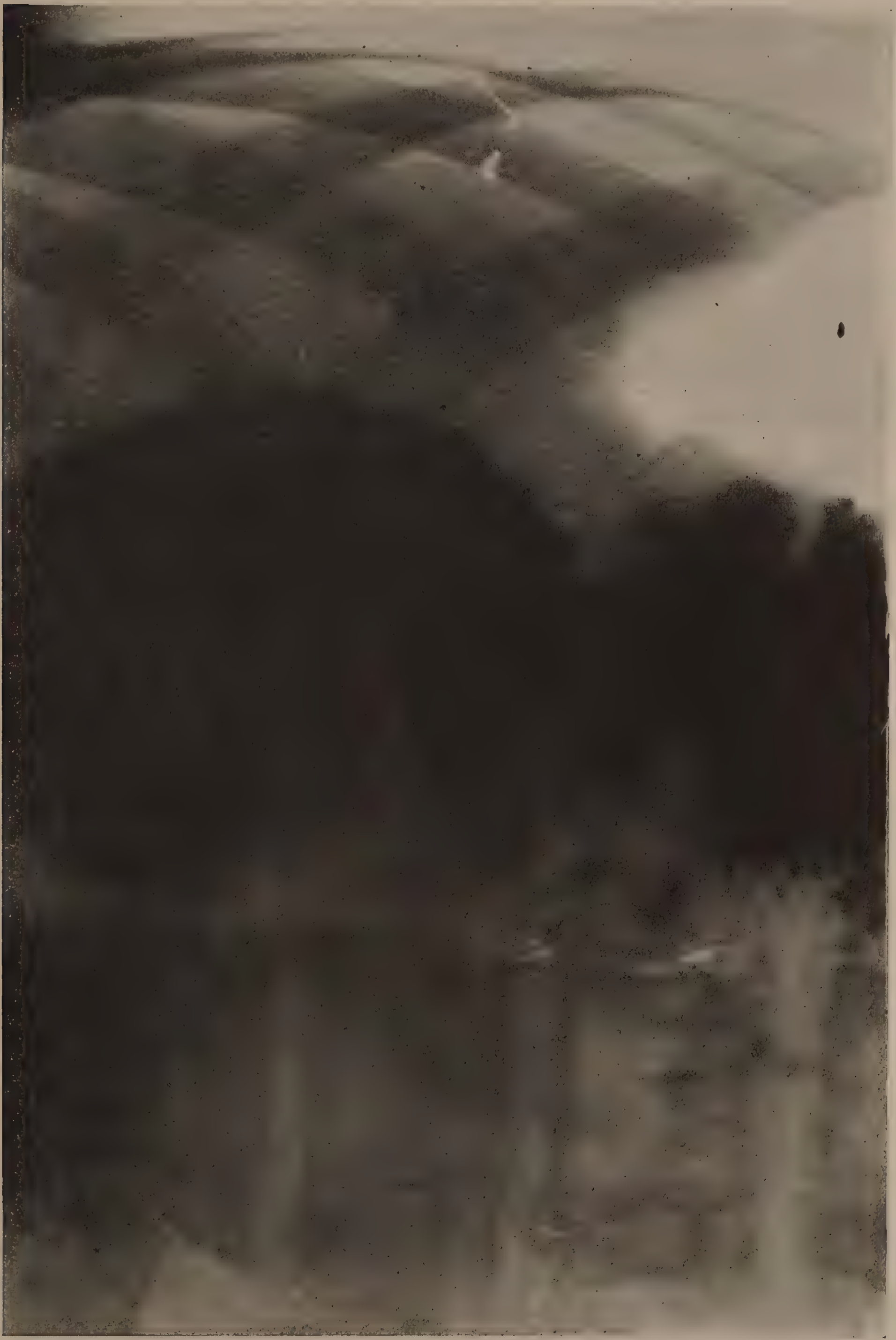
History of present illness.—Patient states that about two years ago he first noticed gastric disturbances consisting of vague abdominal pains, poor digestion, and constipation. This symptom gradually got worse until pains after meals were a marked feature, usually associated with nausea and vomiting, which brought immediate relief. On two occasions he had a typical coffee ground vomiting; and he remembered having passed tarry stools. He had lost considerable weight, and felt so weak that he decided to come to the hospital.

Physical examination.—Emaciated, anemic-looking young negro. Conjunctiva, slightly jaundiced. Ear, nose and throat, negative. Teeth in very poor condition. Thorax, negative. No glands palpable in supra-clavicular region. Abdomen scaphoid. Deeks' signs present. A mass, the size of a small lemon, can be palpated in the epigastric region. It is hard, tender and movable.

X-Ray (*Fluoroscopy*) shows a mass in the stomach which is exquisitely tender to pressure and is situated in the pyloric region along the lesser curvature. The film shows a clear niche in the middle of the small curvature. The diagnosis made by the radiologist was "an indurated gastric ulcer."

Laboratory examinations.—Urine, negative. Meinicke reaction for syphilis, negative. Stool, positive for blood. Red blood cells, 3,175,000. White blood cells, 9,500. Hemoglobin 61%. The patient was prepared for operation with the usual methods.

Operation.—Spinal anaesthesia was supplemented by local anaesthesia and ether. When the abdomen was opened, the stomach was found densely infiltrated by a neoplasm which involved more than two-thirds of it. Many perigastric adhesions, connecting this organ with the adjacent structures, were encountered. There were no signs of metastasis to the liver, and no dense adhesion to the pancreas. A partial gastrectomy was performed, resecting about four-fifths of the stomach. This left such a small gastric stump that a classic Polya-Mayo's gastrojejunostomy was not possible; and therefore, following the



X-Ray Taken Fifteen Days after Operation, Shows Small Gastric Stump and Situation of Entero-anastomosis advice of Balfour, an anti-colic union between these organs was made and supplemented with an entero-enterostomy. The convalescence was very satisfactory, as mentioned above.

Histo-pathological report.—"Clinical diagnosis: Carcinoma of stomach. Microscopic examination: Wall of stomach thickened and infiltrated with numerous eosinophiles and other leucocytes; shows diffuse infiltration with rows and narrow columns of epithelial cells. Microscopic diagnosis: Scirrhous carcinoma. Some of cells suggest colloid change."

Summary.—An unusual case of advanced carcinoma of the stomach, occurring in a 24-year-old negro of a primitive race, is here reported.

It is apparent that the best functional results are obtained with an anti-colic gastrojejunostomy, supplemented with an entero-enterostomy, as recommended by Balfour, when a very wide resection of the stomach is required to treat the lesion encountered.

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HYDATID MOLE OF UNUSUAL SIZE AND DURATION

EDW. I. SALISBURY, M.D.

Compañia Bananera de Costa Rica Hospital

Port Limon, Costa Rica

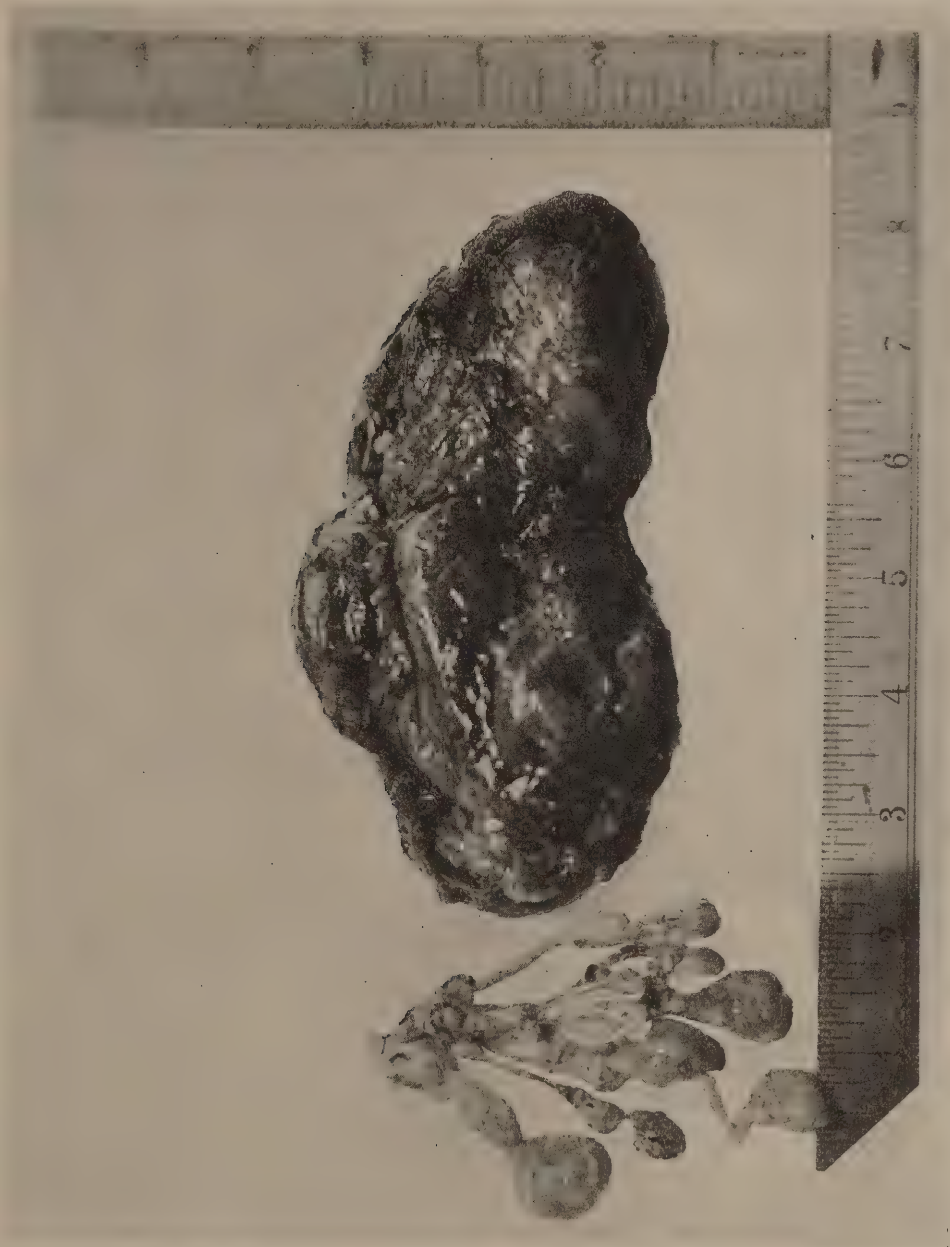
A Costa Rican female, 24 years of age, came to the outpatient clinic on December 6, 1930, to consult us, because she believed herself to be eleven months pregnant and was unable to understand why the baby did not increase in size and she had not delivered. She had further misgivings, because she had consulted a doctor in the city and had been told that she had a tumor.

History.—Menstruation began at 13 years of age. She was married August 21, 1929. No pregnancies. Periods always regular, without pains. Last menstruation, January 15, 1930.

Examination.—Fairly well developed, but slight in stature. General examination revealed nothing of importance except a rounded tumor mass reaching from pubes to two fingers' breadth below the umbilicus. The consistency was alternately soft and hard, showing regular contractions. On auscultation, a bruit was heard to the left of the mid-line, but no fetal heart sounds were elicited.

With bimanual examination, the cervix was found to be moderately soft; and, on moving the tumor mass, the sense of a dead weight exceeding that of a pregnant uterus seemed manifest.

A temporary diagnosis of hydatid mole was made; and she was told to report the



HYDATID MOLE

following week, as it was felt that possibly the patient, who was slightly anemic, might have had a few months of amenorrhoea followed by pregnancy and that on later examination fetal heart sounds might be heard. It was evident, from the rhythmic contractions of the uterus and the localization of a souffle, that we were dealing with an intra-uterine condition and not a fibroid tumor.

The patient returned as requested, and it was ascertained that no change had taken place. The question of surgical intervention was discussed; and the patient promised to talk it over with her family and return. However, due to the Christmas holidays, she postponed her return until December 26th, when she was admitted to the Hospital. She had been flowing since the night of the 24th. A few hours after admission, she was delivered of a tumor weighing nine-and-one-half ounces and measuring approximately 6x3½x4 inches. The tumor was delivered intact. The surface of attachment showed a dark area where separation began; and, on opening the tumor, it was found to be filled with many cysts varying in size up to that of a large Malaga grape.

The patient made an uneventful recovery.

The particular points that are worth noting are: first, the size and duration of the growth; and second, although the usual signs of pregnancy (rhythmic uterine contractions, placental bruit, etc.) were present, there was a difference in the buoyancy of the uterus on bimanual examination and the mass conveyed a sensation of dead weight to the examiner's hand rather than the freely movable or elastic-like sensation observed in pregnancy.

The report of the pathologist, Dr. Herbert C. Clark, Director of the Gorgas Memorial Laboratory in Panama, was as follows: "*Diagnosis:* Chorio-adenoma destruens (hydatid mole). There is preservation of the structure of the villi, orderly syncytium, and Langhan's cells in blocks examined. Necrotic and inflammatory foci found in one block."

LARGE DERMOID CYST OF LEFT OVARY IN CHILD THIRTEEN YEARS OF AGE

E. I. SALISBURY, M.D.

Compañia Bananera de Costa Rica Hospital

Limon, Costa Rica

A Nicaraguan, 13 years of age, was admitted to the Hospital on January 9th, 1931.

Past History.—She had had the usual diseases of childhood, but had never suffered from any severe or debilitating diseases.

Present Illness.—About two years ago she noticed that her abdomen was hard. This seemed to take the form of a large mass that had increased in size. She had never before consulted a doctor regarding it, but had remained within doors recently from a sense of embarrassment. Patient has menstruated regularly for the past two years. Her general health has been fairly good, although she has tired easily from exertion since the abdomen became enlarged.

Physical Examination.—The patient is an adolescent girl of good general appearance and nutrition. Examination of the head and thorax and their organs revealed nothing abnormal. The abdomen appeared enlarged and distended; and, on palpation, one immediately thought of a large spleen, as the mass was hard and extended from under the ribs to the pelvis. However, on closer examination no outline could be felt; and the uniform hardness of the mass extended to the area of liver dulness. The mass was rather rotund and of somewhat softer consistency between the umbilicus and pubes, appearing to be separate from the harder mass above. In the right hypochondrium it was also rounded but firm. On percussion it was dull and there was no hydatid fremitus elicited, nor did succussion or percussion reveal any fluid in the tumor.

Laboratory Examination.—The routine laboratory tests showed the following: *Blood.*—Hemoglobin, 65%; negative for malaria parasites; white blood count, 10,850; differential—neutrophiles (Polys) 79%; eosinophiles 4%; basophiles 2%, transitional 1%; lymphocytes 14%; red blood count, 3,950,000. *Urine.*—Reaction, acid; specific gravity, 1.015; negative for sugar and albumin. Microscopic examination showed very few pus cells. *Stools.*—Ova of Ascaris lumbricoides.

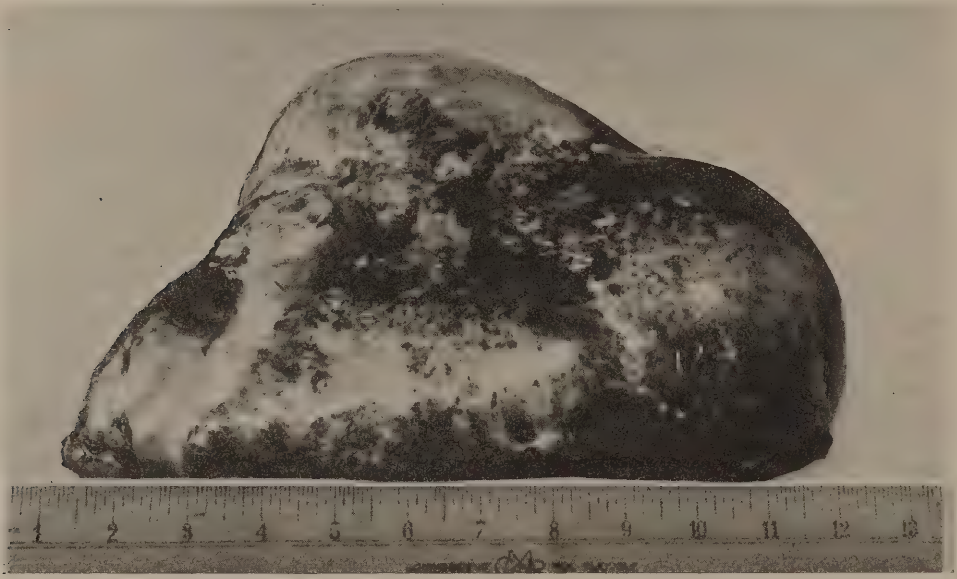
Fluoroscopic Examination of Chest.—Heart shadow was normal, with no displacement; and the lungs were clear. Nothing was revealed on the attempt to fluoroscope the abdomen.

Diagnosis.—Almost every possible condition was considered in the attempt to diagnose the tumor. Fibroid of uterine origin, ovarian cyst, cystic kidney, hypernephroma, sarcoma, mesenteric cyst, splenomegaly and hydatid cyst were considered without arriving at a definite diagnosis. Many pathological conditions were obviously eliminated, by a general summary of the findings and because of the patient's age together with the history of the duration of the tumor and the otherwise good condition of the patient. The last named factor strengthened our hope of success in relieving the patient, if the condition was at all operable; and efforts to make a preoperative diagnosis were abandoned.

Treatment.—The patient was prepared for operation by first ridding the intestine of parasites, and by permitting her to rest in the Hospital until she was tranquil and accustomed to her surroundings and her confidence had been won by the Hospital personnel. On the day of operation she was given Grs. $1\frac{1}{2}$ of amytal, at 6:00 a.m.; and morphine, Gr. $\frac{1}{6}$, and atropine, Gr. $\frac{1}{150}$, at 9:00 a.m. At 9:30 a.m., she accepted her removal to the operating room without nervousness and took her anesthetic quietly.

An incision was made in the mid-line, between the umbilicus and pubes. The diagnosis of dermoid cyst was made, and its origin from the left ovary determined. The incision was enlarged to well above the umbilicus, and the tumor delivered.

One pole of the tumor was adherent to the omentum and structures in the region of the hilus of the spleen. The capsule of the tumor was torn in this region and a yellow, sebaceous-like material escaped into the abdominal cavity. The intestines were crowded behind and above the tumor. The peritoneum was studded with small, hard tubercles. The tumor was excised from its pedicle where the vessels were greatly augmented to carry sufficient blood supply and return. A greatly thickened and elongated appendix was removed. The abdomen was cleansed of the sebaceous material and, because of the decrease in pressure resulting from removal of tumor and to combat shock, the abdominal cavity was filled with saline solution and closed.



DERMOID CYST OF OVARY IN GIRL 13 YEARS OF AGE

Pathological Report.—The tumor weighed twelve-and-one-half pounds. It consisted of two large, rounded masses which filled the pelvis and right hypochondrium; and a solid elongated portion, which in situ extended up into the left hypochondrium. The consistency varied in accordance with the sub-structure.

Before opening the tumor, an X-ray plate was taken. This showed various shadows, which were of indefinite outline except those of numerous undeveloped teeth.

Sections taken from several portions of the tumor were sent to Dr. Herbert C. Clark, Director of the Gorgas Memorial Laboratories in Panama. His report shows the types of structures found: "Pathological Report U. F. Co. No. 4—A dermoid cyst containing (1) A plate of bone weighing 1 gram. (2) A mass of curled stiff hair embedded in sebaceous material. (3) Collections of glandular tissue resembling sweat-glands and pancreas. Focal necroses found. (4)

Collections of pigmented skin showing a few foci of calcification. *Note:* Ewing states that about 3 per cent of such tumors develop a malignant process."

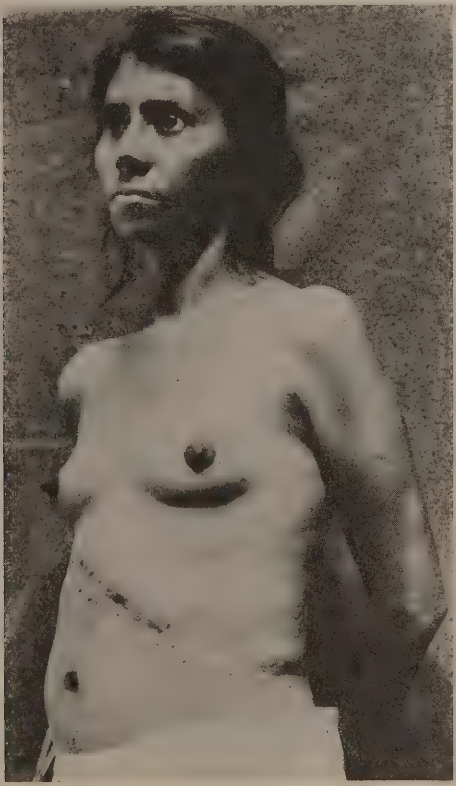
The patient made an uneventful recovery and was discharged from the Hospital on the twelfth day after the operation.

Up to the time of this report, the patient has remained well.

INCISED ABDOMINAL WOUND—CASE REPORT

R. B. Nutter, M.D.
Tela Railroad Company Hospital
Tela, Honduras

A Honduran woman, age 25, resident of Old Tela, was admitted at midnight, June 30th, 1930, one and one-half hours after receiving a knife wound in the abdominal wall. She was brought to the Hospital on a very dirty stretcher, with most of her hollow viscera at her left side, smeared with dirt, and covered by soiled rags.



Incised Abdominal Wound

The uterus, 4½ or 5 months pregnant, protruded through the wound; which extended from the right anterior axillary line, at the costal margin, obliquely downward to 1½ inches beyond the left posterior axillary line, through the abdominal wall, with two wounds in the omentum but none in the intestines.

There was moderate shock and considerable hemorrhage from the wounds in the omentum. The patient was etherized; loose dirt was removed from the intestines, which were replaced; and the wound was swabbed with 2% mercurochrome and sutured with two double tube and gauze drains.

Convalescence was without special incident, and in fourteen days the wound was healed. On the seventeenth day fever and chills began, with lymphangitis and lymphadenitis of the left leg—apparently due to an infected chigger imbedded in the left third toe. Abortion occurred during this febrile attack.

The patient was discharged as well on the 33rd day.

A MACHETE WOUND—CASE REPORT

G. Izaguirre, M.D.
Tela Railroad Company Hospital
Tela, Honduras

A Honduran, age 17, employed in the Agricultural Department, awoke on the morning of October 5th, 1930, to see a vagrant, to whom he had given shelter the

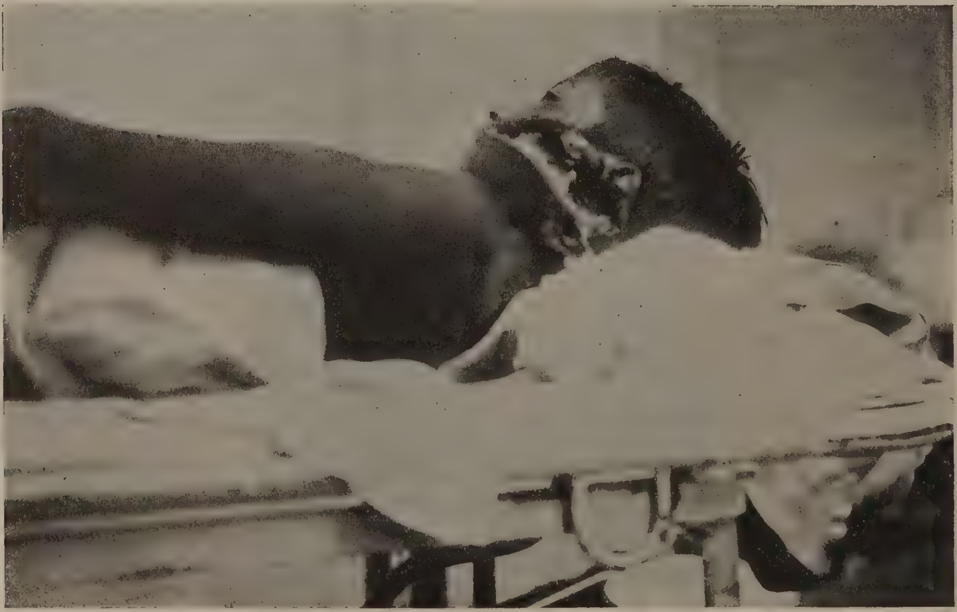


Fig. 1. Machete Wound—Before Treatment

previous night, departing with his only pair of shoes. In answer to his protest, he received a severe wound on the face with a machete. He was admitted to Tela Hospital at 9 p.m.

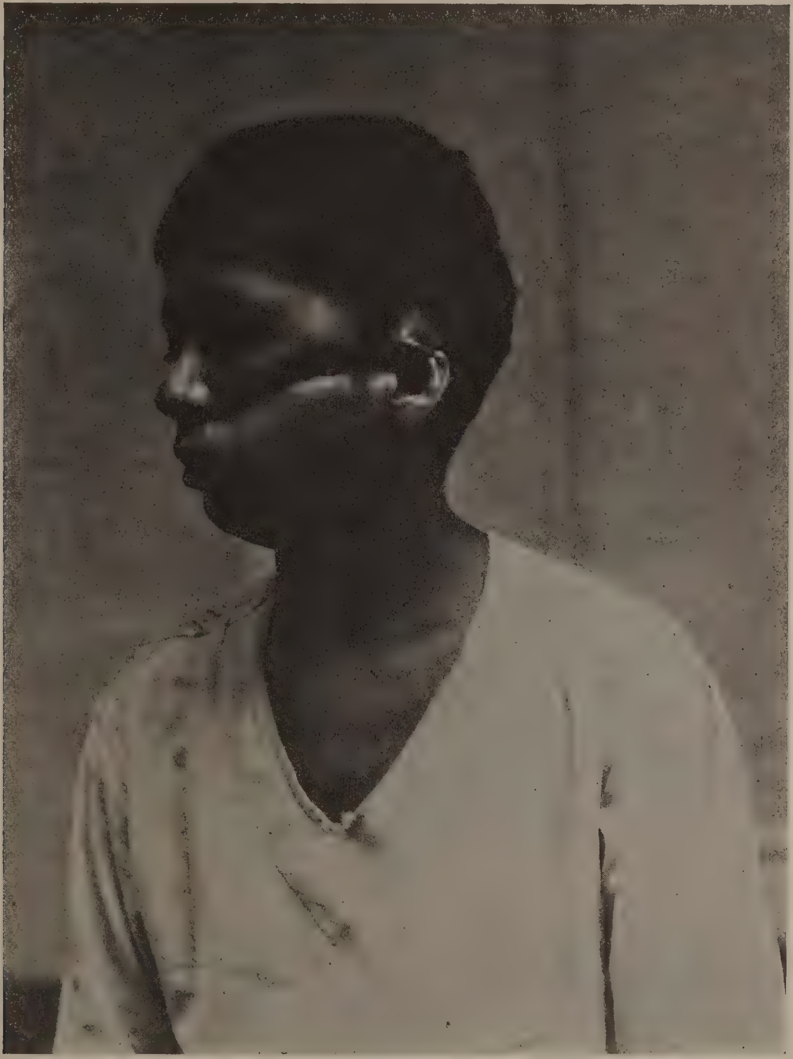


FIG. 2. MACHETE WOUND—AFTER TREATMENT

The wound had been packed with soot to control hemorrhage. It extended from one-half inch below the left nasal ala to two inches back of the left mastoid at the level of the auditory canal; opening the left maxillary sinus, going through the ramus of the jaw and through the mastoid process, and opening the skull but not the dura.

The wound was dressed open, with 5% salt solution packs, until it was clean; and then it was strapped until healed. Union in the jaw is firm with good functional result. Hearing is unimpaired, but there is partial facial paralysis. The patient was discharged on December 27th; and will return in six months for a plastic operation, for better cosmetic result.

AN UNUSUAL CASE OF ASTRAGALUS FRACTURE

Octavio Ortiz, M.D.

United Fruit Company Hospital

Preston, Cuba

Fracture of the astragalus is a rare occurrence. Its mechanism is hard to explain; exact diagnosis is possible only by X-ray; and therapeutic results are mostly not satisfactory because of non-union of the fragments and deforming arthritis. A successful case is reported in the following:

F. N., male, Cuban, 25 years.

Two hours before admission to this hospital patient had his right foot badly twisted in a railroad accident.

The region of the ankle joint showed a large ecchymotic swelling and marked deformation, the foot being in exaggerated internal flexion. A radiogram revealed a complete transverse fracture of the astragalus, separating the head from the body. The upper fragment had left its place between the malleolar processes and was completely turned so that its upper articular surface was looking downward (Plate No. 1).

An operation was performed immediately. A vertical incision was made in front of the external malleolus. The fragment was found underneath the skin. It was torn from its ligaments and became entirely loose during manipulation. Blood clots were removed from the joint cavity and the fragment placed in its anatomical position. The wound was closed and a cast applied.

A slight febrile reaction ensued, but thirty days later the radiogram showed a perfect adaptation of the fragments (Plate No. 2). The head of the astragalus had apparently found a sufficient blood supply and did not suffer degeneration. In due time the cast was removed, and passive and active movements were resorted to. Three months after the fracture the patient had recovered normal function of the foot.

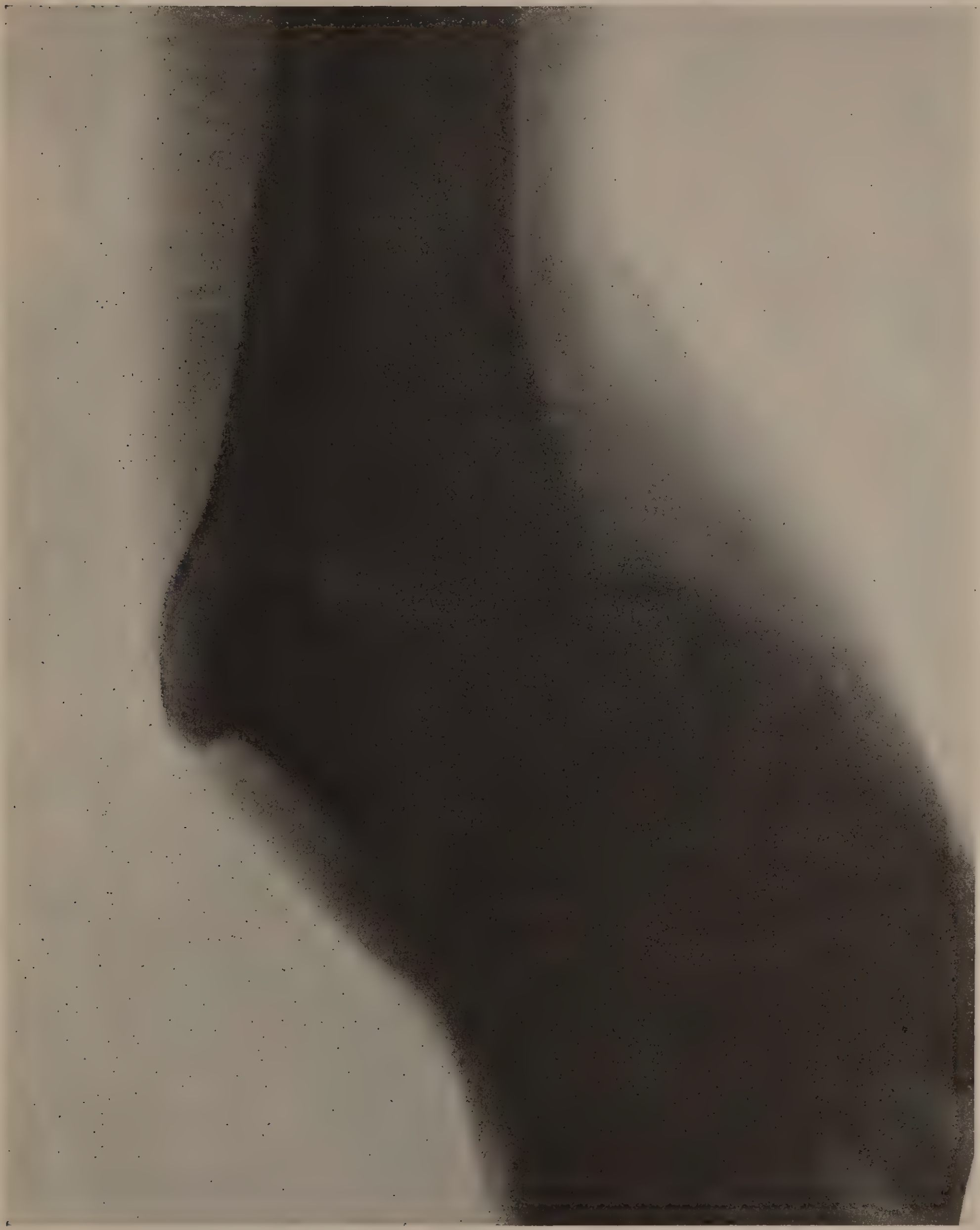


Plate 1. Astragalus Fracture

PLATE 2. ASTRAGALUS FRACTURE

SECTION V

A DISTRICT MEDICAL OFFICER'S ANNUAL REPORT

T. DE LA TORRE, M.D.
United Fruit Company Hospital
Preston, Cuba

Considering that a general summary of the work carried on by a District Medical Officer on a sugar plantation of the United Fruit Company, and of the methods of combating malaria, might be of interest to the readers of the Annual Report, I am endeavoring to present this data in a concise form; and have added a few comments when required, to make the report more comprehensible. Statistics for 1928 and 1929 are shown, for comparison with those for 1930.

GENERAL OUTLINE OF CONDITIONS

The population of the agricultural area dependent upon the District Medical Officer's Dispensary for treatment includes employees, families of employees, and non-employees and their families; and, as the number varies from month to month according to the work and is much higher during the months of zafra (cane-cutting season), the average for each year is given.

	1928	1929	1930
Average population for the year	8,792	12,447	12,199

This population is distributed in four Districts, viz.

	1928	1929	1930
District 1	1,862	2,854	2,811
District 2	3,743	4,659	4,868
District 3	2,115	2,951	2,524
District 4	1,072	1,983	1,996
	8,792	12,447	12,199

The number of laborers included in the above figures is as follows:

	1928	1929	1930
District 1	923	1,440	1,228
District 2	1,579	2,068	1,920
District 3	1,300	1,557	1,211
District 4	670	1,072	1,045
	4,472	6,137	5,404

Consultations and treatments given in the Guaro Dispensary during these years totaled:

1928	1929	1930
9,860	14,903	13,770

The accident cases treated in the Guaro Dispensary during these years were:

1928.—367 or 8.21 percent of the labor population
1929.—610 or 9.94 percent of the labor population.
1930.—600 or 11.10 percent of the labor population.

These accidents represent minor injuries, which do not require hospitalization but which receive treatments in the dispensary; and also a certain number which receive first-aid, and then are sent to the hospital. The higher percentages recorded in 1929 and 1930, as compared with 1928, do not demonstrate an actual increase in the *total* number of accidents for all Departments of the Division, as the figures include only the treatments administered in the Guaro Dispensary.

The following table gives the number of positive cases of malaria in the respective Districts in 1930, and the percentage of such cases in relation to the total agricultural population.

	Average Population	Positive Cases	Percentage
District 1	2,811	47	1.67
District 2	4,868	448	9.2
District 3	2,524	165	6.53
District 4	1,996	211	10.57

Reports of these cases are sent periodically to the Agricultural Department for their information, accompanied by recommendations for sanitary measures of importance.

District No. 1 is mostly highland; is well drained and easy to sanitate; and has never had a high malarial rate.

District No. 2 includes several towns and villages, in which malaria has been well controlled. Its extreme borders adjoin the lands of other sugar mills, where anti-malaria measures are not followed. Naturally, the interchange of laborers from these centrals makes malaria control difficult; and it is from these sections of the district that we get most of our cases.

District No. 3 has conditions somewhat similar to those existing in District No. 2; but it has been possible to exercise better control over sanitation, which is reflected in the lower malaria rate.

District No. 4 is situated at the extreme west end of the Division, partly between two sugar centrals and very near the large town of Cueto. More than fifty percent of the laborers in this District reside outside of the Company's property; and, having a constant interchange of laborers, we experience great difficulties in our endeavors to control and follow up malaria treatment. Due to the fact that Cueto town is more accessible than the Company's Dispensary, and to their tendency to use well-advertised proprietary preparations; a great many laborers suffering with malaria apply to the local physicians for treatment, or visit the town and return home with several bottles of some patent medicines which possess little or no physiological value. In consequence, labor days are lost and malaria is more widespread.

The number of malaria cases sent to the Hospital for 1928, 1929 and 1930 respectively, in relation to the total population of the agricultural area, is as follows:

	1928	1929	1930
Average population	8,792	12,447	12,199
Sent to the hospital	257	187	119
Percentage	2.92	1.5	.97

The cases sent to the hospital are (a) those who, although not in need of immediate hospitalization, live in barracones as bachelors and have no way of taking care of themselves; (b) those who are heavily infected with crescents, and are consequently a menace to the community; and (c) those who are so acutely ill that they require hospitalization for most advantageous treatment.

ROUTINE MALARIA TREATMENT AND SURVEYS

All patients applying to the Dispensary for treatment have their blood taken and examined; and those found positive for malaria are given plasmochin, quinine, and Pink Tonic Pills (a compound of iron, arsenic, quinine, and strychnin). A careful record is kept; and a copy of this record, detailing the name, age and residence of the patient, is sent to the Superintendent of the District where he resides. Another copy is given to the Malaria Inspector, with instructions to visit each patient periodically and to see that he is taking the treatment as ordered. This Inspector is also expected to detect ailing persons who have not reported to the Dispensary; to take their bloods; and to administer preliminary treatment. In cases of children, the parents are required to bring them to the dispensary for instructions and treatment.

General field surveys of school children and adults are made from time to time; and all persons whose blood is positive for malaria are required to come to the dispensary, where the initial laboratory findings are checked and treatment instituted. Three school surveys, and two field surveys among the adults, were made during 1930. The results were:

SCHOOL SURVEYS

Date	Bloods Taken	Positives	Percentage
March	423	46	10.87
August	555	6	1.08
October	392	1	0.25

ADULT FIELD SURVEY

Date	Bloods Taken	Positives	Percentage
February	500	70	14.
October	446	9	2.02

The first survey of school children showed a rate of infection of nearly 11%; while the later surveys, made after treatments, showed marked decreases. Similar results were obtained in the adult field surveys.

MALARIA CONTROL MEASURES

The District Medical Officer has direct control over sanitary measures of the Division. The Preston Division is administratively and geographically divided into four districts, with a total of 211 miles of streams and rivers and 257 water taps with drainage ditches. There is a diversity of topographical features, and varying rates of rainfall.

District	Total Acreage	1930 Rainfall
1	76,549 (partly mountainous)	52.97 inches
2	50,814	53.83 inches
3	26,191	49.70 inches
4	17,497	42.90 inches

The difficulty of controlling or preventing the breeding of mosquitoes may be appreciated, when it is realized that the Division has an area of 171,051 acres, and an average rainfall for 1930 of 50.40″—which is the third highest in a 12-year period (1926 having had 55.32″ and 1924, 60.77″).

There are 182 miles of railroad lines, along which are located 170 switches. Most of these switches are cane-loading points, near which are situated the various "bateys" or groups of living quarters; and it is at these points that we concentrate most intensively on breeding-control measures. Due to many more or less permanent areas of water throughout the Division, the control measures are applied only to those which are closest to habitations.

Weather conditions are a factor in the routine of the control work, but an effort is made to treat each breeding area at intervals of not more than 10 to 15 days. To do so more often would be more effective, but the area to be covered will not permit. With the gradual elimination of certain water areas, the intervals between treatments of potential breeding places may be materially reduced. At present it is a question of "the greatest good to the greatest number."

The *modus operandi* of the control work is, viz.:

One anti-mosquito squad (working out of Guaro, the Agricultural headquarters) covers the entire Division. This gang, comprising one inspector who serves as a *capataz*, four larvicide appliers, and one chauffeur for the gas car, after loading the car with materials, leaves the Sanitary Depot at 6 a.m. each working day. They proceed to the end of the line in the area to be covered, and work back towards headquarters. On arriving at the selected destination, the *capataz* assigns each man to a given area to apply either larvicide dust or oil, as conditions indicate. Crude petroleum, thinned down with motor distillate, is used on all water drains and pools closest to habitations to control Culex as well as Anopheles breeding. This is applied with a knapsack sprayer carried by a laborer, who is accompanied by another laborer using a mop (a piece of old sacking about two feet long tied to a stick by swiveled wire) with which he thoroughly agitates the oil and spreads it to all parts of the water area being treated. The other two larvicide appliers are in the meantime spreading the Paris green dust mixture (carried in sacks, and spread by hand in a manner similar to hand-sowing of grain) over other water areas farther away from the habitations. When the oil has been applied these two men take sacks of the larvicide and help complete the work of distributing the Paris green. The oiling, mopping and dusting is rotated each week among the men, as the oil work is very hard on clothing. No ill physical effects have been noted from the use of the Paris green mixture, as has been the case in some places.

Every man of the gang, from the *capataz* to the chauffeur, is trained in larval inspection and is intimately acquainted with the location of active and inactive breeding areas.

The materials used to make up the larvicidal dust are: saw-dust, procured gratis from the company's sawmills at Preston and Guaro; and air-slaked lime, procured at a nominal cost from the Division kiln. Wood ashes are used, when conveniently available. In preparing these materials, the saw-dust is sifted through a movable frame covered with screen wire and fitted with handles at each end. The saw-dust is placed on this frame, which is then shaken back and forth by hand. When the saw-dust is sifted, the lime is added and thoroughly mixed—by bulk, one-third lime to two-thirds saw-dust. The mixture is now ready for the addition of the Paris green. A 50-gal. metal drum, mounted on an axle and suspended on a frame so that it may be rotated, is used. Into this, simultaneously, is added one part of Paris green to one hundred parts of the dust mixture; the opening is closed securely; and the drum is revolved slowly for ten or fifteen minutes, thus thoroughly mixing the combination. The mixture is then put into 5-gal. tins, so that it may be handled conveniently on the gas car. It is then very easy to place it in the shoulder sacks, from which it is distributed as described previously.

As shown by the daily written reports of the gang *capataz*, the consumption of larvicides during 1930 was as follows: Paris green, 1,325 lbs.; crude oil, 2,055 gals.

Before closing this report, I want to express my appreciation to Mr. W. D. Torrey, Malaria Control Inspector, for the data on malaria control given above.

THE LOWER CLASS OF TROPICAL AMERICAN PATIENTS

A Psychological Sketch

Jose A. Lopez, M.D.
Truxillo Railroad Company Hospital
Puerto Castilla, Honduras

In writing this, I am thinking of the pure Indian and of the mestizos; but intentionally overlooking the Mosquito Indian with his strong dash of negroid blood, and that steady but powerful and ever-increasing colored wave coming from the West Indies and other sources of negro blood.

Let the first mentioned individuals drift across your mind as a parade of sadness and disease—of short stature, lemon-colored skins, high cheek bones, and with soft brown eyes possessing a Mongolian slant that reminds you of a mighty invasion which came trickling down America by way of Behring lands, God knows when. Their hair is black, straight, and coarse like a horse's mane. Sexually, the syndrome of Fröhlich minus the adiposity exists.

There is an air of dreaminess about them that verges on apathy, as they lounge in front of their camps. The insidious laziness is induced by impoverished blood, where the plasmodia of malaria have been playing havoc. If you can sit, why stand? If you can lie down, why sit? Such is their motto. They lie in their hammocks, smoking and looking at the skies; they sit on the railroad tracks, and grunt as approaching trains disturb their repose.

Their sense of responsibility is nil; but we must remember that their minds are as virgin as the primeval jungles which surround the plantations. The future is something intangible and non-existent. Their "mañana" is only a convenient waste basket to which can be relegated all the tasks that should be accomplished in the present—especially so if, in any way, they would interfere with rest of soul and body.

Their mental age is that of a moron. The minds of children are present in the adult bodies; and their response to the daily realities of life agrees in full with their infantile traits. Egocentricity characterizes them. Their sensual pleasures must always come first; and the wishes of other persons had better be withdrawn to the background, thus avoiding trouble. You will see this in their travels and visits. If a mule is to be had, the male will ride and the spouse will follow on foot. He will partake of the daily bread until his appetite is satisfied to the limit. The leavings are divided among the remaining members of the family. Like all children, they are cruel. When sober, they take delight in inflicting slight tortures. When alcohol has abolished their inhibitions (which are extremely scant), they indulge in an extreme form of sadism under the slightest provocation. In the hospital, I have seen them laughing when a friend or a companion was groaning in pain; and I have seen their wide grins when the patient in the adjoining bed was painfully breathing his last. I have heard their rollicking laughter when someone was narrating how somebody else's head was chopped off at the last free-for-all fight.

Man has three different channels for escaping from the realities of every day life. They are: work, love, and alcohol (or drugs). To escape from the drab daily existence through work, you must do something congenial to your inner self. Your work is the greatest outlet for self-expression to be had; and self-expresson is the third main hunger of man, assuming a predominating influence once nourishment has been obtained and there is an object to be loved—be it a woman or a pet parrot. But when working under the tropical sun; wading in the mud during the rainy seasons when frequent showers keep your back well drenched; being ordered by an overseer to move about, while fever, chills, and headache are urging you to lie down and die—then is the time to choose more pleasant avenues of escape, and love and alcohol play their winning hands.

The love life of our patients is extremely easy and simplified, as some believe love was meant to be. All of those complicated stage effects, a product of a morbid civilization, crumble down like a castle made out of cards. Romance has been ordered out of the room, with its trinkets of the flirt—coy glances, blushing, and faintly perfumed notes. Quoting their own words, elicited while histories are being taken in the hospital—"I have not used a woman for such and such a time." And that is what they do; use a woman in the same manner that you use your cuspidor when expectorating, or as you use a cigarette case to contain your cigarettes.

Companionate marriage advocates in the United States should come down to the American tropics to get post-graduate courses in their pet hobby. When a man brings home a wife, he will also bring and take care of those children resulting from her former love enterprises. They rarely marry—first of all, it is too expensive; and, secondly, it would be "cramping their style." If a woman sees another "mozo" who looks better to her than her present lord; she promptly packs up her few belongings, gathers her progeny, and quickly departs. She could never do that if she were legally married. The more generous type of man will usually let his woman take along with her the few cooking utensils or the portable victrola they had jointly owned. The less considerate man will save all of the furnishings for his next mistress; who may be installed within three days.

The third available means of escape is alcohol; and, as I said before, that is when the sadism is plainly shown. Drinking is usually done around the time of the monthly payday. That is the occasion when all past grudges are settled. The chief weapon is the machete; and the most ghastly wounds result. Seldom will you see a single cut inflicted, even if the first one was fatal in itself. Usually they number up to six, ten, or fifteen. Frequently, the brains are exposed and limbs are amputated. There is no sense of value of a human life. There are no regrets; and no pangs of conscience. Escape to the mountains is easy, once the destructive emotion has been satisfied.

These men suffer from a strong inferiority complex. Since time immemorial they have been humiliated and stamped upon, told to shut up and to keep out of sight, and pushed and otherwise slighted. They were conquered by arrogant conquistadores; they were enslaved by the Spanish "blue bloods;" and now they must obey the overseers and contractors. When *fiat lux* was pronounced for the "superior" whites, they remained in an abyss of darkness. They are nearly a hundred per cent illiterate, and are a prey to all sorts of charlatans. That fact has made them distrustful of mankind in general. Their mode of compensation for their inferiority is pitiful—they try to show off, and will buy a twelve-dollar Stetson hat when they have scarcely any money to buy food with, or wear a flashy silk shirt while yet their feet are bare. It may be that their fatalistic attitude towards life in general is just a crystallization of all the abuses they have been subjected to.

Modern doctors make a poor showing with these people. Imbedded deeply within their virgin minds there lingers the spectacular, feather-crowned, awe-inspiring ghost of their former medicine men. As we go around their camps in our mud-covered clothes, we look too much like an average human and too little like a god. We pour pills out of a glass vial, in a matter-of-fact manner. They never see us on all fours, searching around for mysterious herbs; we do not roam the forests at night, hunting for an elusive animal in order to prepare a powerful potion out of its entrails; we never order our medicines to be taken only on Friday night after midnight when the moon is shining out in the skies.

The stethoscope is our only instrument of magic. With it, we are able to "listen in" to all kinds of maladies. Once, when I was dressing a wound, the patient begged: "but doctor, why don't you sound me?"

Patent medicines are also extremely impressive. All the printed matter on their labels leaves absolutely no doubt as to their curative power. All diseases are due to "poor blood." If you can lay your hands on a "good tonic," you are saved. Some of the more enlightened ones have discovered the mysterious hypodermic needle. Here is where charlatans and quacks reap their harvest. A medicine shot through a needle is the quickest cure-all for every ailment; and they do not hesitate to pay five dollars for 5 c.c. of water if a puncture has been made to put it in the body.

When working in the different plantation camps, the great problem is to make them understand the importance of quinine therapy. There is positively a quinine-phobia. Malaria with its varied and insiduous symptomatology baffles them. They may admit that quinine stops their fever; but when the clinical picture changes, and the fever is so slight as to be scarcely noticed, then they will fight anyone who may endeavor to administer the drug to them. In many cases, when they come to a physician to seek relief from a certain symptom due to plasmodium infestation, if he produces some quinine tablets he is in great danger of life and limb. When they make up their minds to have their fevers treated they always believe that the drug used in the Hospital has some special curative power not possessed by the same drug when it is given to them at their camps.

In regard to venereal diseases; they have not the slightest conception as to the mode of contracting the malady. It is their idea that gonorrhea comes either as the result of a strain, as in lifting some heavy weight, or else is due to getting their bodies wet by a shower when they were hot and perspiring freely. They will argue this point with the doctor in the hospital; and, no matter how cleverly you may present your arguments, they will always be received with a grin of of incredulity and a look of pity for your profound ignorance.

When this type of patients comes into the hospital, they are usually less pugnacious than they are at home. Nearly all their boisterousness is gone, and they resort again to their fatalistic attitude of mind. Strict diets are something they hate. They cannot understand why you should not eat if you are hungry, no matter if your intestines are badly ulcerated. If a patient is dying, and you start to give some hypodermatic stimulation, they often take it for granted that you are giving him the final push to accelerate his departure from this world.

The writer has attempted to give some idea of the patients we have to examine and treat. They are not bad; they are only children who have never grown up mentally, and their helplessness should always stimulate us to give them our very best assistance.

POST-MORTEM SUMMARY

WALTHER JANTZEN, M.D

Truxillo Railroad Company Hospital

Puerto Castilla, Honduras

During the year 1930, 100 adults and 25 children (up to 12 years of age) died in the hospital. No extraordinary or striking features were found as the cause of death. The average age of the adults who died was 30 years. The oldest were 70 years (1 case), and about 60 years (2 cases). With the exception of a few who died at about 50 years of age, all were far below the average ages of death in the temperate zone.

Thirty-six autopsies were performed.

The percentage of malaria among our autopsies was rather high. Five cases (two were children) showed all symptoms of acute malaria; and two of these showed complications; one premature childbirth and one heart failure. Hemoglobinuric fever was seen five times. Three of these cases had a pronounced dilatation of the heart and a very flabby myocardium. In these, the hemoglobinuric process had stopped some days previously; and there was no blockage of the urine, according to the clinical symptoms. Evidences of chronic malaria, such as malarial pigment and enlargement of the spleen, were frequently present in patients who died from other causes.

Five patients died of septicemia, the origins of the process being: once, an abscess of the foot; another, leg ulcers in a very anemic man (35% Hb.) with a chronic splenomegaly (weight of the spleen 1400 grms.); the third case was complicated with amebic dysentery, severe anemia of unknown cause, and necrosis of the gums; the fourth case developed septicemia after childbirth outside of the hospital; the fifth was of unknown origin.

Mycotic endocarditis of the mitral valve was found in one autopsy as a cause of death. Myocarditis with hypertrophy and dilatation of the heart (weight 400 grms.) was the apparent cause of death in another case; and bronchopneumonia, and a large spleen weighing 1850 grams, were found as complications. The epicardium showed, in this case, many supra-arterial fibroid nodules; and, clinically, there was a heart-block. Dilatation of the right ventricle in a very hunchbacked woman, after Caesarean section, was the apparent cause of death in another case. One patient, a Jamaican negro about 30 years of age, died of luetic endocarditis of the aortic valve with aortitis. The heart was extremely enlarged and weighed 725 grams.

Lobar pneumonia and bronchopneumonia were recorded 6 times as the cause of death. The inflammatory process involved more than one lobe, as a rule; and complications such as empyema, pleurisy and pericarditis were found.

Cirrhosis of the liver (one syphilitic) was seen twice. Death was caused once by contracted kidneys, with hypertrophy of the heart and hypostatic pneumonia of both inferior lobes; once by uremia in consequence of chronic parenchymatous nephritis; and once by congenital cystic kidneys of immense formation and uremia in a man 35 years of age. A necrotic abscess of the spleen in one case caused a general peritonitis, which decided the issue. Pyosalpingitis and pelvic abscess, complicated with severe anemia and tertiary syphilis, were found once. One case died of pneumococcic meningitis; one, of beri-beri; and one, a 7 months old child, of acute enteritis. One death from gunshot wounds was autopsied, and extensive lesions of the ileum with general peritonitis were present.

PROGRESS IN THE SURVEY FOR BLOOD PARASITES OF THE WILD MONKEYS OF PANAMA*

HERBERT C. CLARK

From the Gorgas Memorial Laboratory, Panama, Republic of Panama

A brief report (1) on this subject was published some months ago. It was confined largely to three species of monkeys captured in the province of Chiriqui, Republic of Panama in the month of July, 1929. Since that time it has been possible to revisit that general region. The camp was located this time on the Rio La Vaca in the area known as the Coto. It is a large uninhabited area that contains abundant animal life. This expedition was made in the dry season (February) 1930. Another expedition was recently made (August, 1930) to the mid-basin of the Tuira river in the province of Darien. One of our objectives on this trip was to secure some specimens of *Ateles dariensis* Goldman. We were not successful in securing this species for they have been either killed off by the indians for food or frightened into more remote parts of the river basin. It will be necessary to make a more extended trip into the headwaters of the basin during the dry season. It is impossible to find any part of this river basin totally uninhabited since it is a fertile area with many scattered indian villages. In order to take the black spider monkey in a region reasonably free of human habitations we will be forced to hunt the mountain boundary line between the Tuira river of Panama and the Atrato river of Colombia.

During the year a certain number of local monkeys have been purchased from hunters who have held the animals in captivity from a few days to a few months, the time necessary to bring them to Panama city and to find a sale for them.

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This report will consolidate the results of our three expeditions in which wild monkeys were killed or caught and examined in the camp. These animals were as remote from native and indian villages (human contact) as it is possible to be in this era of the Republic of Panama.

A second part of the report will consist of the findings in purchased captive wild monkeys, in other words, monkeys that have lived a brief period of time in captivity in some rural village and later in Panama city. Our studies on the two groups of monkeys thus permits a report on one or more specimens from eight species of local monkeys. Goldman (2) considers these the chief species or subspecies found in Panama with the exception of a subspecies of the Chiriqui titi and the Coiba island howling monkey.

The monkeys are listed according to Goldman (2) as follows:

1. *Saimiri örstedii örstedii* (Reinhardt). The titi monkey of Chiriqui, Panama.
2. *Aotus zonalis* Goldman. The night monkey of eastern Panama.
3. *Leontocebus geoffroyi* (Pucheron). Squirrel monkey or mono titi.
4. *Alouatta palliata inconsonans* Goldman. Panama howling monkey, mono negro.
5. *Cebus capucinus capucinus* (Linnaeus). Colombian white-throated capuchin.
6. *Cebus capucinus imitator* Thomas. Panama white-throated capuchin.
7. *Atelus geoffroyi* Kuhl. Geoffroy's spider monkey, mono colorado. Red spider monkey.
8. *Ateles dariensis* Goldman. Darien black spider monkey.

METHODS OF EXAMINATION

Blood films and crushed tissue films were prepared and stained in the camp. The thick-blood-films were thoroughly dried and then laked and stained in an aqueous solution of Giemsa's stain for a period of one hour using 1 cc. of stock solution of Giemsa's stain to 30 cc. of water that had a reaction closely approximating that of fresh rain water or fresh distilled water. Wright's stain was used on the other films and then counterstained with Giemsa if the animal had been dead for more than an hour or two. These prepared slides from autopsied monkeys and blood films from the few we could capture in an unharmed condition were brought back to Panama for detailed microscopic examination. Eight infant and juvenile monkeys were brought back for laboratory observation. The results are tabulated by species.

Saimiri örstedii örstedii (Reinhardt), (table 1)

The adults of this species average about 2 pounds but ranged from 1½ to 2¼ pounds in body weight. They showed the presence of microfilaria in 83.3 per cent yet in no instance could adult filaria be found in any of the serous cavities. Trypanosomes were present in 26.6 per cent. Malaria was not found in any of the 60 specimens nor was the spleen pigmented or enlarged. The spleen in this species weighs about 1 gram for every pound of body weight.

TABLE 1

SAIMIRI ÖRSTEDII ÖRSTEDII (REINHARDT). THE TITI MONKEY OF CHIRIQUI PROVINCE. EXAMINED IN THE WILD STATE

Age	Number Examined	Malaria Parasites	Trypanosomes	Microfilaria	Spirochetes
Infants	1	0	0	0	0
Juveniles	3	0	0	1	0
Adults	56	0	16	52	0
Total	60	0	16	53	0

Aotus zonalis Goldman, (table 2)

These appear to be young adults. They range in weight from 530 to 565 grams. They weigh less than their appearance indicates. The spleen weight average on three of these monkeys was 1.3 grams. The ratio of this weight to the body weight is, therefore, about the same as in the Chiriqui titi. No malarial pigment found in the three examined at autopsy.

TABLE 2

AOTUS ZONALIS GOLDMAN. THE NIGHT MONKEY OF PANAMA

(Captive wild animals)

Age	Number Examined	Malaria Parasites	Trypanosomes	Microfilaria	Spirochetes
Infants	0	0	0	0	0
Juveniles	0	0	0	0	0
Adults	4	0	1	1	0
Total	4	0	1	1	0

Leontocebus geoffroyi (Pucheron), (table 3)

The adults of this species weigh from 1 to 1½ pounds. Spleens weigh from 1 to 2 grams and never have shown pigment suggestive of malaria. The species reveals about the same rate for filariasis and trypanosomiasis as other monkeys. No adult filarial worms were found in the serous cavities.

It shows a marked variation from all the other species in its ability to act as a host for spirochetes. Two wild monkeys and one captive wild monkey showed a spirochete resembling *Treponema recurrentis* Lebert (3).

TABLE 3

LEONTOCEBUS GEOFFROYI (PUCHERON). SQUIRREL MONKEY OR MONO TITI

Age	Number Examined	Malaria Parasites	Trypanosomes	Microfilaria	Spirochetes
(Tuira River wild animals)					
Infants	0	0	0	0	0
Juveniles	1	0	1	1	0
Adults	21	0	18	18	2
Total	22	0	19	19	2
(Captive wild animals)					
Infants	5	0	1	0	0
Juveniles	14	0	1	2	1
Adults	9	0	6	7	0
Total	28	0	8	9	1

Alouatta palliata inconsonans Goldman, (table 4)

Adults of this species range from 16 to 19¼ pounds. The spleen weight in the animal weighing 19¼ pounds, an old male, was 48 grams or about 2.5 grams of spleen weight to 1 pound body weight. The spleen was pigmented and revealed some malarial parasites. No adult filarial worms were found in the serous cavities.

TABLE 4

ALOUATTA PALLIATA INCONSONANS GOLDMAN. PANAMA HOWLING MONKEY, MONO NEGRO

Age	Number Examined	Malaria Parasites	Trypanosomes	Microfilaria	Spirochetes
(Chiriqui and Darien wild animals)					
Infants	0	0	0	0	0
Juveniles	0	0	0	0	0
Adults	6	1	5	0	0
Total	6	1	5	0	0
(Captive wild animals—locality unknown)					
Infant	1	0	0	0	0
Juvenile	1	1	0	0	0
Adult	0	0	0	0	0
Total	2	1	0	0	0

Cebus capucinus capucinus (Linnaeus), (table 5)

These adults range from 5½ to 8½ pounds. These spleens weigh 10 to 14 grams or about 2 grams to each pound of body weight.

Many adult filarial worms are found in the abdominal cavity and infrequently in the pleural, pericardial and scrotal sacs. The splenic pulp not infrequently shows pigmentation.

TABLE 5

Cebus capucinus capucinus (Linnaeus). The Colombian White-throated Capuchin, Commonly Known as White-Faced Monkey

(Chagres and Tuira Rivers wild animals)

Age	Number Examined	Malaria Parasites	Trypanosomes	Microfilaria	Spirochetes
Infants	1	0	1	0	0
Juveniles	2	1	1	0	0
Adults	8	0	1	5	0
Total	11	1	3	5	0

Cebus capucinus imitatur, (table 6)

The body weight for adults averages 5 to 6 pounds while the spleen weight average is about 10 to 12 grams or 2 grams to 1 pound of body weight.

TABLE 6

Cebus Capucinus imitatur, White-throated Capuchin of Chiriqui, commonly known, Also, as White-faced Monkey

(La Vacca and Rio Blanco Rivers)

Age	Number Examined	Malaria Parasites	Trypanosomes	Microfilaria	Spirochetes
Infant	1	0	1	0	0
Juvenile	5	5	2	0	0
Adult	32	1	15	32	0
Total	38	6	18	32	0

TABLE 7

Age	Number Examined	Malaria Parasites	Trypanosomes	Microfilaria	Spirochetes
Cebus monkeys. (Captive wild monkeys—locality unknown)					
Infants	3	0	1	0	0
Juveniles	3	2	1	1	0
Adults	0	0	0	0	0
Total	6	2	2	1	0
Ateles geoffroyi Kuhl. Geoffroy's spider monkey, mono colorado. Red spider monkey. Wild animals—La Vacca and Blanco Rivers, Chiriqui)					
Infants	8	8	0	0	0
Juveniles	6	6	1	2	0
Adults	52	11	6	54	0
Total	66	25	7	56	0

All adults had filarial worms in peritoneal cavity and sometimes in other serous cavities. Many animals, young ones in particular, show pigmentation of the spleen.

Cebus monkeys, (table 7)

The adult weight ranged from 11 to 21 pounds, the average being 16 to 17 pounds. The spleen ratio in infant and juveniles was about 10 grams to 1 pound of body weight and about 2 or 3 grams to the pound in old adults. Splenic enlargement associated with pigmentation was very common. A vast number of adult filarial worms were found in the peritoneal cavity of this species in adult animals but seldom found in juveniles and not at all in infants. These parasites were occasionally found in the other serous cavities.

TABLE 8

Species of Monkey	**Number Examined**	**Positive Malaria**	**Positive Trypanosomes**	**Positive Microfilaria**	**Positive Spirochetes**
Saimiri örstedii örstedii (Reinhardt). (The Chiriqui titi monkey)	60	0	16	53	0
Aotus zonalis Goldman. (The night monkey)	4	0	1	1	0
Leontocebus geoffroyi (Pucheron). (Squirrel monkey-mono titi) . . .	50	0	27	28	3
Alouatta palliata inconsonans Goldman. (Panama Howling monkey. Mono negro)	8	2	5	0	0
Cebus capucinus capucinus (Linnaeus) and *C. c. imitator.* White throated monkey	55	9	23	38	0
Ateles geoffroyi, Kuhl. Red spider monkey. Mono colorado	75	34	8	56	0
Ateles dariensis Goldman. Darien black spider monkey*.	1	1	0	0	0
Total	253	46	80	176	3

*This animal was given its malaria by direct inoculation of blood from a red spider monkey that had malaria.

In addition to these animals there were 6 juvenile and 1 infant red spider monkey brought back alive and in good condition. All of them were positive for malaria and one juvenile showed a few trypanosomes. We have purchased two juvenile red spider monkeys in Panama city that came from Chiriqui and these also are positive for malaria.

Ateles dariensis Goldman. The Darien black spider monkey. No capture and examination in the jungle has yet been made by us but we have purchased one juvenile that was negative for all blood parasites although it died of malaria in forty-eight days after being inoculated with malarial blood from a red spider monkey. Its body weight was $5\frac{1}{2}$ pounds and the spleen weighed 19 grams, or 3.4 grams of spleen to 1 pound of body weight.

A composite table of all monkeys whether examined in the wild state or conducted on purchased animals recently made captives is given (table 8).

The gross and microscopic pathology, intestinal parasites, etc. can not be detailed in this report. It may be stated, however, that malaria, filariasis and spirochetosis play important rôles in certain species and that the trypanosomes apparently cause little or no harm to the monkeys nor to guinea pigs and *M. rhesus* monkeys when injected into them.

SUMMARY

1. During the past eighteen months 210 native wild monkeys and 43 native captive monkeys have been examined for parasites of the blood stream. The only difference the two groups show is a decrease in the intensity of the infections in most of the captive animals rather than any difference in parasite species.

2. *Monkey malaria.* The present state of our knowledge indicates that many infant monkeys of the prehensile tail species, especially the *Ateles* and *Cebus* species, die of this disease. We have observed four such deaths. Those that survive this period are moderately good carriers of the disease through the juvenile period of life. During adult life other diseases and particularly late stage pregnancy seem to provoke a recrudescence in some animals. In these species of monkeys the spleen weight shows a ratio of 2.5 to 4 grams to each pound of body weight while in those species in which malaria was not found the spleen rate was 1 gram to each pound of body weight. Malarial pigmentation of the spleen is common in the prehensile tailed species and not yet found by us in the other species. The malarial parasites found closely resemble human quartan and tertian malaria. Nothing that resembles *P. falciparum* has been found here.

3. *Monkey trypanosomiasis.* All species thus far examined by us show this parasite except *Ateles dariensis.* We have seen but one specimen of this monkey, a juvenile raised in captivity. Adults examined in the wild state will almost certainly show some individuals harboring this parasite. The infection appears to offer little injury to the animals and does not take in the ordinary laboratory animals into which it has been inoculated. Morphological studies will be reported at a later date.

4. *Monkey filariasis.* This is an important monkey disease, particularly in the *Cebus* and *Ateles* species. We have not yet examined a satisfactory number of the howling monkeys (*Alouatta palliata inconsonans* Goldman). There is a marked proliferative peritonitis present and in some cases a sero-purulent fluid is found. Vast numbers of adult-parasites are found in the omentum and also free in the cavity. Omental adhesions are common and occasionally pleural and pericardial adhesions also are present. Further studies are in progress and a report pending.

Filariasis in the titi species and the night monkey are of a different order. No adult parasites have been found by us in the cavities of the two titi monkeys although their blood films are positive in almost every case.

5. Malaria is a disease of infant and juvenile life while trypanosomiasis and filariasis are chiefly noted among the adults.

6. *Monkey spirochetosis.* This has not been found spontaneously in any but the titi monkey commonly known as the squirrel monkey *Leontocebus geoffroyi* (Pucheron). It is fatal in most instances to infant and juvenile members of this species in captivity while an adult recovers spontaneously in a very few days. The rate of demonstrable infection in the wild is very low for adults. We have not been able to examine enough juveniles and infants in the wild to learn the incidence in them.

7. Our chief interest surrounds the possibilities of transfers of these infections to man or domestic animals and our efforts have been used in this direction rather than to complete the protozoological and pathological studies or to enter the equally interesting study of the parasites to be found in the alimentary tract. The old monkeys (in the wild) have much of interest in diseases of bones and joints and the genito-urinary system.

8. *Ectoparasites.* These are found but with great difficulty on the animal, although we have seen one severe louse infestation in the *Ateles* species. It is our belief that the ticks, lice and fleas common to these monkeys are more apt to be found at night while the animal is at rest in its favorite shelter. This of course confronts one with some major problems in observation yet it may be possible to study the dens of night monkeys, *Aotus zonalis* Goldman, since their habits are quite similar to those of squirrels.

Mosquito studies are in progress in relation to monkey malaria, and tick observations are under way in regard to possible transfers of the monkey spirochete.

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SPIROCHAETOSIS IN A WILD MONKEY OF PANAMA *Leontocebus Geoffroyi* (PUCHERAN)*

GEOFFROY'S SQUIRREL MONKEY; MONO TITI

HERBERT C. CLARK, M.D.
Director, Gorgas Memorial Laboratory
Panama, R. de P.
and
LAWRENCE H. DUNN
Medical Entomologist and Assistant Director
and
JOAQUIN BENAVIDES
Chief Technician

As far as we can learn from a review of medical indices no report of spirochaetosis in western hemisphere monkeys exists at the present time although naturally occurring spirochaetal blood infections of monkeys have been observed on several occasions in the tropics of the eastern hemisphere. Wenyon (1) states that Castellani and Chalmers reported it in Colombo (1910), Thiroux and Dufougeré in Senegal (1910), Ranken in Sudan (1912) and Plimmer in the Zoological Gardens in London (1912). Wilbert (2), Pasteur Institute at Kindia, in Guinea, West Africa reports a spirochaetosis in the chimpanzee that was transmissible to man.

During the past two years we have made three jungle expeditions and have had numerous other opportunities to study the blood films of eight species of monkeys common to the Republic of Panama. Most of our attention has been given to two species (*Cebus* and *Ateles*) (3) but the recent months have provided opportunities to study the species *Leontocebus geoffroyi* (Pucheran). This animal is known locally as the marmoset, squirrel monkey and mono titi. It provides the city of Panama with as many pets as the capuchin monkeys. We received a juvenile specimen of the squirrel monkey on May 20, 1930, in a consignment of four infants and juveniles of the same species, that had been captured in the jungle at no great distance from the towns of Arraiján and La Chorrera. The former town has for years been known as an endemic center for relapsing fever and studies (4) of this disease have been made using material from this town. In a spirit of levity one of us (H. C. C.) suggested that our usual search of blood films should in this case include careful observations for spirochaetal infection as well as a search for the parasites of malaria, trypanosomiasis and filariasis. On May

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26, 1930 one of us (J. B.) found this juvenile squirrel monkey (Lab. No. 18) positive for a fair number of spirochetes in both the thin and thick blood films. This monkey rapidly developed a massive spirochaetosis and died May 31, 1930. Before its death, however, we had transferred the infection by direct blood inoculation to other animals (squirrel monkey, white rat and a *Cebus* monkey). On questioning the man from whom the purchase was made it was learned that the animal had spent two or three days and nights in the rural villages before arrival in Panama city where it had also spent some days before coming to the laboratory. This left us in doubt as to whether the spirochaetosis had been acquired in the jungle or in one of the towns while en route to us. Since the discovery of this case we have examined 30 other locally purchased specimens of this species of monkey (infants, juveniles and adults) without finding another case of the disease. During the month of August, 1930, one of us (H. C. C.) made a three weeks trip to the mid-basin of the Tuira river in search of two species of animals desired by the laboratory and while after these the hunters brought to the camp near Boca de Cupe 22 squirrel monkeys. This species is very abundant in the valley. Two of these disclosed a scant number of spirochetes in their blood films. Animal experimentation with the strain from the original monkey (Lab. No. 18) has shown us that the infection is easily transferred by direct blood inoculation and that in from 24 to 48 hours the blood films will reveal the parasite. The following laboratory animals have been injected with the parasite:

White mouse.
White rat.
Guinea pig.
White throated monkey (*Cebus capucinus imitator* Thomas).
Red spider monkey (*Ateles geoffroyi* Kuhl).
Night monkey (*Aotus zonalis* Goldman).
Squirrel monkey (*Leontocebus geoffroyi* Pucheran).

The infection disappears in two to three days as far as blood film findings are concerned and the animals recover, except in the case of infant and juvenile squirrel monkeys. Sixteen of these show 14 deaths and 2 apparent recoveries. The deaths occurred in from 7 to 86 days, the average time being a month. Usually two important paroxysms occurred in which the last paroxysm showed massive infection and autoagglutination. None of the adult squirrel monkeys nor other species of animals ever showed a massive infection. There has been some difficulty of late in securing *young squirrel monkeys* to carry on the strain. Ticks were considered as likely carriers of the spirochete which morphologically resembled *T. recurrentis*. We secured ticks from the Chagres river villages (*Ornithodoros venezuelensis*) and prepared for tick feeding experiments as well as possible storage of the spirochete in ticks.

Efforts to Cultivate the Spirochaete: We owe our thanks to Maj. Geo. C. H. Franklin, M. C., U. S. A., of the Board of Health Laboratory, Ancon, C. Z., for this work. He made his blood cultures from the heart's blood of the first subinoculated adult squirrel monkey (Lab. No. 14) at the height of its first paroxysm. The method used consisted of three ordinary test tubes each of the following:

1. Agar 2% sol. 2 parts.
   Ascitic fluid 1 part.
   Piece of rabbit kidney size of a pea in the bottom of each tube.
   No adjustment of reaction.
2. (a) Normal salt solution 80.
   (b) Fresh rabbit serum 100.
   (c) Agar 2% sol. 100 (PH 7.4).
   (d) Rabbit haemoglobin (made by laking one part of defibrinated rabbit's blood with three parts of distilled water).

Mix (a) and (c), autoclave, cool to 55° and add (b) and 15 cc. of (d).

Before inoculating, all tubes were incubated at 37°C. for 48 hours and found to be sterile.

All tubes received 1 c.c. of whole fresh blood from the heart of the monkey while it was under ether anesthesia. The tubes were then kept at 32° C. for 7 days when transfers of 0.1 c.c. from the bottom of No. 2 media were made to a similar media and also to a media consisting of 1 part of rabbit's serum and 9 parts of reaction. At the end of 14 days and 21 days like transfers were made from the inoculated tubes of the previous week.

Microscopic examination of material from the bottom of the rabbit's serum media at 7-day intervals failed to reveal any spirochaetes. At 7 days and 14 days a few microfilaria and a few trypanosomes were found in two of the tubes.

The ascitic fluid was first examined at 14 days, again at 21 days and no organisms of any kind were found. No transplants were made from this media. The microscopic examinations were made by dark-field and Giemsa stained preparations.

Transfer of the Monkey Spirochete to Man: Our plans called for three methods of transfer as follows:

> One man was to receive a subcutaneous injection of fresh heart's blood from a juvenile monkey at a stage of massive infection with the spirochete. A second man was to be subjected to tick biting with adult *O. venezuelensis*. These ticks had fed on severe infections of the spirochete in juvenile squirrel monkeys. A third man was to be bitten by the larval ticks developed from the eggs of the adult ticks (*O. venezuelensis*) after the latter had fed on the infected monkey to learn whether the spirochaetal infection passed through the egg of the tick to the next generation.

Since the character of the spirochaete was unknown, it did not seem wise to expose three men at one time to an unknown spirochaetosis; therefore, the first stage only of the work was started with the direct method.

We worked in these human tests in collaboration with Gorgas Hospital and the Panama Canal Department of the United States Army. We owe a great debt of gratitude to the Commanding General of the Panama Canal Department for his assistance in seeking human volunteers and also to the Surgeon of Corozal Post for the selection of the kind of men we desired from the list who volunteered.

Direct Method Transfer: P. F. M., male, white, 28 years of age, from the state of Maryland and length of residence on the Isthmus 19 months was accepted for this experiment. He was admitted to Gorgas Hospital on July 29, 1930 at 2 p.m. He was pronounced normal by the staff of this hospital on July 31, 1930; and at 4:15 p.m. on this date he was taken to the Gorgas Memorial Laboratory and given a subcutaneous inoculation of 15 min. of fresh whole blood from the heart of a juvenile squirrel monkey (Lab. No. 30) whose blood contained at the time an average of 15 spirochetes to each microscopic field. The monkey was given ether anesthesia during the aspiration of its blood. It rallied in an excellent manner and is still living.

A control monkey (Lab. No. 28) was inoculated at the same time and from the same animal used on P. F. M. This control monkey died in 33 days from the spirochetosis it acquired.

August 2, 1930, P. F. M. developed a violent reaction about the site of the injection part of which was intradural as well as subcutaneous. Local cold applications were given for a few days when it completely subsided. He complained of severe headache, chills and periods of sweating profusely. Temperature rose to 104.8 degrees. Nausea and no appetite even for water or fruit juices. His temperature dropped to 99 the next day and rose on the following day to $102\frac{3}{5}$. It fell again to 101 but rose next day to $103\frac{2}{5}$, and then fell by crisis to 98 which ended the first paroxysm. Blood culture on August 5, 1930, was sterile. There was not the massive evidence of spirochaetosis in this man's blood film that is so marked in all of the young squirrel monkeys. The blood film records as follows:

August	4, 1930, 7:40 a.m.	Thick film	8	spirochetes.
“	4, 1930, 1:15 p.m.	“ “	15	“
“	4, 1930, 4:00 p.m.	Thin film	1	“
“	4, 1930, 8:30 p.m.	Thick film	1	“
“	5, 1930, 8:30 p.m.	“ “	1	“
“	6, 1930, 7:45 a.m.	“ “	5	“
“	6, 1930, 8:35 p.m.	“ “	4	“
“	7, 1930, 7:45 p.m.	“ “	1	“
“	8, 1930, 7:40 p.m.	“ “	1	“

A young squirrel monkey (Lab. No. 39) was inoculated with this man's blood on August 5, 1930. It developed a massive spirochetosis and died on Sept. 6, 1930 (32 days).

There were extenuating circumstances not connected with the medical or experimental questions in this case which caused us to place him on treatment for spirochetosis without waiting to determine what his period of relapse might be. He, therefore, received 3 doses of Novarsenobenzol (.4 grm., .6 grm., and .6 grm.) and was discharged on August 27, 1930.

Description of Spirochete (William M. James, M.D. Chief of Medicine, Panama Hospital & Herrick Clinic). The organism from two cases of the squirrel monkey spirochaetosis corresponds very closely to the morphology of the various species causing relapsing fever in man, particularly *F. recurrentis*. In the dried and stained blood films the organism is flattened out and many do not show the coils. These organisms vary greatly in length and in the number of coils. They range from 6 microns in length, with only three to four coils, to 30 microns. The latter were probably dividing forms. Most of the organisms were 8 to 12 microns in length and the length of the average coil is just a little over 2 microns. The organisms do not stain uniformly but give a suggestion of a rather granular interior structure, with clear spaces, particularly about one quarter of the distance from the end. This clear space is so constant that it deserves recording. The dark field shows the organisms as very uniform in appearance and very active. They are very resistant. In some vaseline ringed preparations they remained alive and very active at room temperature for over 24 hours and probably would have lived much longer. The coils are more constant in the dark field and a little closer together. The fresh preparations, in many individual organisms, contained highly refractive granulations, sometimes as many as two or three in number. These increase in number as time passes so that at twelve hours most of them show three to five granules. Many active division forms were observed. The process takes place by transverse division. No real agglutination was observed in the fresh specimens. 250 of the spirochetes in the dried and stained films and an equal number in the dark field were studied and measured.

Stages Two and Three of the Experiment: These are in progress now but sufficient time has not elapsed to report results.

TENTATIVE CONCLUSION

1. The spirochete of the squirrel monkey of Panama is apparently the same or very closely related to those described by Bates (4) and Brumpt (5) (*S. Neotropicalis* or *T. venezuelense*).
2. The infant and juvenile squirrel monkey of Panama makes a better host for the parasite than adults and other monkeys, rats or mice.

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BOOK REVIEWS

BRIEF REVIEW OF KOLLE AND WASSERMANN'S HANDBOOK OF PATHOGENIC MICROÖRGANISMS, VOLUME VII, 1930, BY PROFESSOR DR. RUGE

Kolle and Wassermann's Handbook of the Pathogenic Microörganisms, Volume VII, 1930, contains a monograph on malaria by Professor Dr. Ruge. This vast subject is dealt with exhaustively, although condensed to cover a space of only 196 pages.

Dr. Ruge's contribution deserves special merit in that the references show that he has made a complete study of malaria literature between the years 1880 (when Laveran discovered the parasite) and 1928. Part of the bibliography which was used, is given at the end of each chapter; which is very convenient for reference. In view of the extensive amount of subject matter covered in the treatise, it is necessary for the reviewer to limit his comments to data that he considers of special interest to our medical staff.

Chapter I deals with the geography and history of malaria. There is a chart showing the occurrence and distribution of the three types in the different continents and countries of the world. In this chapter alone, over 90 references are given.

In Chapter II (Malaria Parasites), the different names for the several stages of development of parasites are tabulated in the form of a chart. This should prove very helpful when studying foreign malaria literature, as the names vary with the authors and countries.

In dealing with the diagnosis by the thick-film method, the author rightly points out the difficulty often encountered in differentiating quartan (sporulating form excepted) from tertian parasites. He further warns against basing the diagnosis of a parasite on the "red chromatin dot" and without the blue-stained plasma.

The author firmly believes, with the majority of malariologists, in the existence of plurality of species; as opposed to the unitarian theory that all forms of malaria parasites are only varieties of a single species. The chief reasons offered against the latter theory is that mutation from one group into another, e.g., estivo-autumnal to tertian, has never been observed; and, furthermore, it has been shown that it is possible to eradicate one form of malaria in a community and another still remains present.

The mosquitoes responsible for the transmission of malaria are reviewed extensively in Chapter III, which is illustrated with a number of excellent though mostly schematic drawings.

Dealing with the epidemiology, the author summarizes the present conception as follows: *"Malaria is transmitted only by Anophelines, and the malarial parasites circulate only between man and mosquito."*

This is followed by a description of the different methods of Malariametry (the measure of the presence of malaria in a given sector by determining the parasite rate and splenic index of the population) in use now. [In this respect it appears at the present time as if matters have become further complicated through the decision of the League of Nations Malaria Commission to distinguish between the terms "spleen index" as referable to the percentage of splenic enlargements among children under 12 years of age, and "spleen rate" as referring to the percentage of enlarged spleens found in the total population. Up to now, there is no universally standard method of Malariametry, and for the purpose of control methods under present conditions, the custom of American Malariologists to give preference to the parasite rate over the spleen rate seems the practical thing to do. The reviewer.]

The comments on the results of research pertaining to the nature of the pigments found in the deep tissues of malaria patients are interesting.

Haematin, which is found exclusively in the reticulo-endothelial cells, is the malaria pigment proper; whereas the pigment called *haemosiderin* is found in the parenchyma cells of the liver, spleen and bone marrow. Ruge believes that the blocking of the reticulo-endothelial apparatus by *haematin* is one of the factors which prevents the sick organism from forming natural protective substances to counteract the effect of the toxins produced by the parasites. *Haemosiderin* and *haematin* both contain iron, but the latter when stained gives a positive iron reaction only after treatment with ammonium sulphate.

It is remarkable that during the malaria attack many more red cells are destroyed than have been infected by parasites. This is probably due to the action of malaria toxins in liver and spleen.

The author points out that the severity of clinical symptoms depends less on the number of parasites found in the blood than on the kind of parasites and the susceptibility of the individual. He exempts from this rule, however, the most severe septic cases of e. a. malaria, when 70 to 80% of the red blood cells are infected with parasites.

During the febrile period, a positive Wassermann reaction is reported in about 30% of the cases. It has been found that the positive reaction occurs with more frequency in tertian than in e. a. and quartan infections. Although the reaction is negative in the spinal fluid, the colloidal gold reaction is reported positive in about four-fifths of those examined.

Concerning death from malaria, Ruge says that it occurs most frequently in

e. a. malaria, and may be provoked through several pathological processes of which the more frequent ones are as follows:

1. A septicaemic-like flooding of the blood stream with malaria parasites. (Death from toxaemia).
2. A cerebral attack (about 50% of all deaths). In such cases are found:
   (a) small punctate haemorrhages into the brain-matter (haemorrhagic encephalitis).
   (b) malaria granuloma (granulated glia-cells with a necrotic center).
   (c) In some rare instances a purulent leptomeningitis due to the toxins.
3. The cardiac form (about 14% of all acute malaria deaths) due to a blocking of the capillary blood vessels of the heart with parasites.
4. The rare renal form which leads to a tubular-glomerular nephritis through a blocking of the renal capillaries.

In chronic cases, deaths occur from (1) rupture or torsion of the spleen, and (2) malaria cachexia.

The author's view regarding the pathogenesis of blackwater fever accords with the views of the majority of malariologists—i.e. that repeated attacks of malaria, generally e.a., act as the predisposing factor, and quinine acts as the immediate factor in precipitating the attack in the majority of cases.

Since the introduction of induced malaria as a therapeutic agent in the treatment of paresis, we have learned more about the incubation period of the disease. The incubation period after induction by mosquito biting, was found to be 14 to 19 days for tertian, and 9 to 12 days for estivo-autumnal. There was no difference in the incubation periods of infections caused by single and multiple mosquito bites nor did the severity of the attack depend on this; but the individual who had previously suffered from malaria generally showed, when reinfected, a shortened period of incubation.

Ruge distinguishes between a primary and secondary latent infection. The former is manifested in the individual who has been infected for the first time, but shows no clinical symptoms nor parasites in the blood until some accident occurs such as intense insolation, exposure to cold or rain, change of climate, psychic shock or trauma, childbirth, or surgical operation brings the latent infection into evidence. This primary period of latency could also be termed *prolonged incubation period.*

The *secondary period of latency* is that which we term *clinical malaria.*

The author does not believe in an *absolute* natural immunity to malaria; but admits that a *relative* immunity (resistance) does exist among certain individuals and races.

Acquired immunity is not rare in regions where a high endemic malaria index exists throughout the year. It will, for the most part, be a partial so-called toxin immunity (presence of parasites without clinical symptoms); but perhaps there does exist among certain races an absolute acquired immunity toward the toxins and parasites as well.

In this connection the author stresses the point that malaria is a "children's disease;" and that, as up to 50% of the malaria-infected children carry gametes, they are the most dangerous sources of infection. In the worst malaria regions, up to 100% of the children are infected.

Regarding control measures, Ruge recommends methods similar to those which are being followed by the United Fruit Company. The general prophylactic measures advised are as follows:

(1) Campaign to destroy larvae and adult Anopheles.
(2) Drainage
(3) Screening, mosquito nets
(4) Campaign for education of the native population
(5) Koch's method of looking up the sick at their dwellings and treating them
(6) General quinine prophylaxis; which he admits is the most difficult to carry out of all these measures, as its success depends largely upon the coöperation of those mostly concerned

The last chapter deals with the technique of blood examinations; the catching and breeding of mosquitoes; and the examination of mosquitoes and their larvae.

At the end of the book there are 9 plates, most of them coloured, which are the best that the reviewer has ever seen.

E. THONNARD-NEUMANN.

INDIAN MEDICAL RESEARCH MEMOIRS

Studies in the Parasitology of Malaria

Knowles, Lt. Col. R., I.M.S., and Senior-White, R., F.R.S.E., assisted by Das Gupta, B.M., assistant Surgeon, pp. XII + 436, Memoir No. 18, December. 1930. Calcutta: Thacker, Spink & Co. (19s. 8d.)

The simple title of this Memoir does not convey an idea of the enormous amount of work contained therein. It is a treatise of 436 pages including a very valuable bibliography of 32 pages. Many references are contained therein to the work done by the physicians and investigators associated with the United Fruit Company.

There is an excellent index and many instructive charts and graphs.

Section One which comprises the principal part of the Memoir contains 228 pages. In these are reported all of the observations which the authors could collect from all parts of the world with respect to the incidence and distribution of the three species of the malaria parasites. In all they collected the results of the examinations of 207,260 positive slides which showed the following distribution of species throughout the world.

P. vivax	88,501 or 42.7 per cent.
P. malariae	16,501 or 8.0 per cent.
P. falciparum	102,258 or 49.3 per cent.

These figures do not include malaria in armies. It is interesting to note here that they report only 883 positive observations from the Canal Zone, and give the following distribution.

P. vivax	324 or 36.7%
P. malaria	4 or 0.5%
P. falciparum	555 or 62.8%

The report on Hemoglobinuric Fever in the Canal Zone by Deeks and James in 1911 showed a total of 13,000 positive malarial infections from January 1908 to September 1910, and it is interesting to note that the distribution is very much the same as that given in the smaller figures.

The Memoir contains a very large number of most interesting observations on all aspects of the malaria problem, and one cannot but admire the energy which prompted the authors to publish so valuable a contribution. They bring out very clearly the dependence of quartan malaria on very limited physiographical conditions. There are interesting sections on the examination of the blood and the results obtained by various staining methods. The superiority of the thick film method, in giving a higher percentage of positive findings as well as in saving time, is clearly shown; although it is some times difficult to diagnose a species when only small rings are present. When practicable the culture method of diagnosis, both of the disease and of the species seems to be the best, but most of all is the training and experience of the observer and the personal factor. Some very interesting experiments in diagnosis by trained observers are reported, and when only one ring form of each species was shown, the divergence of opinion would be considered remarkable, except among those of us who have tried to do the same thing. When the entire slide was examined most of the experts agreed. Some interesting conclusions are:

> The distribution of malaria in general throughout the world is limited by the summer mean isotherms of 60°F., and the distribution of P. falciparum by those of 70°F.
>
> The distribution of P. malariae throughout the world suggests that this is a dying species with existing foci in Indo-China, Gondwana-land and the Caucasus.*

The authors express themselves on the association between *P. falciparum* and *black-water fever* as follows:

> "Finally, in connection with *P. falciparum*, is its reputed association with black-water fever. We are far from being convinced that this is definitely

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* There is also a definite focus in Haiti, as shown by Herbert C. Clark in various reports to the Medical Department of the United Fruit Company. W. M. J.

> established. The senior author of the present Memoir considers that the cell inclusions described by Leishman (1912), which he has also seen himself at autopsy on a case of this disease, and which are apparently characteristic of it, may point to a filterable virus as its causative agent.
>
> "What is the real relationship—if any—of blackwater fever to malaria? It was once held that kala-azar was but an expression of extremely heavy malarial infestation, since the geographical distribution of kala-azar coincided with that of *P. falciparum* in the areas concerned, and as malaria parasites were frequently found in kala-azar patients. Exactly similar arguments are used today regarding the relationship of blackwater fever to malaria."

The reviewer cannot agree that the same arguments which were used to show that kala-azar is related to malaria, and those used today, or even many years ago, regarding the association of black-water fever with malaria, are comparable and similar.

Kala-azar is a disease which is limited to the old world. The reviewer doubts that it occurs in Paraguay. He was there quite recently. *Leishmaniasis* is very common indeed in that country, and so are infections with *P. falciparum*; and black-water fever is not rare. The physicians in Asuncion did not mention kala-azar as one of their endemic diseases, and they are thoroughly familiar with *Leishmaniasis*. In passing, the reviewer might state that Asuncion is a veritable laboratory for the study of New World tropical infections and infestations. However, until the exact mechanism which brings about that phenomenon known as *black-water fever* has been determined, absolute proof that it is due to malaria will, of course, be lacking.

There is a marked difference between theoretical and actual relative distribution of the three species within the area bounded by the 70 F. summer mean isotherm, and the authors concluded from this that the factors covering the relative distribution of the three species are not yet at all understood.

The parasite findings in armies both in peace and war may be expected to differ from those in the civilian population in the territory in which they are operating. Other observations are as follows:

> Mixed infections constitute about 3.7 per cent of the general malaria of the world and are distributed as follows:—*P. vivax* plus *P. malariae* 9 per cent; *P. vivax* plus *P. falciparum* 79 per cent. *P. malariae* plus *P. falciparum* 10 per cent; *P. vivax* plus *P. malariae* plus *P. falciparum* 2 per cent.
>
> The relative gametocyte output of the three species is for *P. vivax* 21 per cent; *P. malariae* 45 per cent; *P. falciparum* 19 per cent. Great variations are found especially in the case of *P. falciparum.*
>
> The conclusion of Sinton (1927) that the maximum output of gametocytes by *P. falciparum* occurs after the close of the transmission season is confirmed by our own findings as well as by the results from many other parts of the world.

> A preliminary study of untreated cases of malaria by enumerative and cultural methods leads us to believe that usually malignant tertian malaria does not persist in an individual in the absence of repeated fresh injections of sporozoites.
>
> Crescent development is not associated (in culture) with an increase in the acidity of the environment. Growth and development of both schizonts and gametocytes of all three species in culture is inhibited below a pH of 6.0.
>
> Methyl alcohol as a fixative for subsequent staining by Giemsa's stain cannot be trusted after five days from the opening of the ampoule in the moist tropics.
>
> Given a competent observer, examination of 100 fields of a thin film plus a reasonably careful examination of one thick film will enable a positive diagnosis to be made in 95 per cent of all cases of developed malaria; but will only discover 67 per cent of the cases of mixed infection.
>
> However highly trained the observer, our experiments show that it is utterly impossible to make a species diagnosis from the examination of a single ring-trophozoite form.
>
> Our experiments show that a 95 per cent agreement in diagnosis can be expected from five minutes' examination of a thin film by recognized experts. With post-graduate students of the "brigade or divisional laboratory standard" a 75 per cent agreement was reached with the same procedure.
>
> Despite the length of this Memoir our final conclusion is that our present-day knowledge of malaria is remarkably meagre.

This is a truly admirable contribution to the study of malaria. The data are excellently presented and very likely are correct from a statistical point of view. The reviewer regrets that lack of space prevents him from giving a more detailed account of the many interesting observations. Work like this is of real value to those who have inquiring minds with respect to the many problems which are yet unsolved in the study of this world-wide scourge.

Notwithstanding the conclusion of the authors that our present day knowledge of malaria is remarkably meagre, the reviewer wishes to state that the knowledge of the authors in this respect is substantial and ample, and it is only their modesty that causes them to use the language of their final conclusion.

W. M. JAMES.

Panama City, R. P.

SOME GENERAL RESULTS OF A STUDY OF INDUCED MALARIA IN ENGLAND

James, Lt. Col. S.P., M.D., I.M.S. (Retired) Adviser on Tropical Diseases to the Ministry of Health.

Trans. Royal Soc. Trop. Med. and Hygiene, 1931, March 13, Vol. XXIV No. 5 pp. 477–538.

In this paper Colonel James reports his observations on artificially induced malaria since March of 1926. This includes one thousand three hundred and fifty six cases, of whom nine hundred eighty five developed benign tertian malaria as a result of the first biting, and three hundred and seventy one failed to do so. In addition, a considerable number of patients were infected with *P. vivax* by direct blood inoculation. Colonel James was unable to infect the salivary glands of any mosquitoes with quartan malaria, but did infect by direct blood inoculation forty-five patients. Twenty patients were infected by direct blood inoculation with *P. falciparum*. He also had failure in infecting mosquitoes in England with this parasite.

In passing Colonel James states that in the treatment of general paralysis by inoculated malaria of more than three thousand patients nearly 20% were able to be discharged, and nearly 12% of the total were described as recovered; and he considers this the most effective form of treatment at present.

He remarks on the difficulty of infecting the mosquito used, which was *A. maculipennis*. In the feeding experiments on quartan malaria, sporozoites were not at any time found in the salivary glands; although the blood used for feeding contained a relatively high percentage of gametes. Other observers have made similar reports.

The same was true in England with regard to infection with *P. falciparum*, but when he took his mosquitoes to Rome he found one patient there from whom he was able to infect them. Colonel James is of the opinion that the number of gametocytes is not so important as their quality, by which he means the ability of the male gametes to exflagellate. He found that his mosquitoes were constantly negative to infection with *P. vivax*, when the examination of moist chamber preparations kept in the incubator at 25°C. for fifteen minutes showed fewer than one exflagellating male to one thousand leukocytes. This, however, is not altogether true with respect to *P. falciparum* and *P. malariae*. In infections with these parasites even the finding of considerable numbers of exflagellating male forms is not a sure sign that *maculipennis* will become infected. He also found in general, as far as *P. vivax* is concerned, that the more often the mosquitoes were fed the more zygotes were formed in the stomach. There was, however, an enormous variation in the number of zygotes in the stomachs of mosquitoes fed at the same time.

Colonel James considers the problem of infecting mosquitoes to have many points of interest, and notes that he was inclined to believe that the *maculipennis* of England had developed into a race refractory to *P. falciparum*, until in a batch of them which was taken to Italy, they found that a strain in one patient, whom they called a good infector, infected 50% of their mosquitoes. In some mosquitoes the zygotes failed to develop to the sporozoite stage and this was particularly true in their attempt to infect mosquitoes with the quartan parasite.

With respect to the so-called immunity, Colonel James makes some observations which must be carefully read to be appreciated. He states, that failures in patients who have never previously been infected with malaria, are about as frequent in cases in which the procedure is by direct blood inoculation, as they are when the procedure is by mosquito bites, and thinks that some failures must be explained on technical rather than on biological grounds. He does not agree with the usual view, that the finding of sporozoites in the salivary glands of the mosquito immediately after it has bitten a patient necessarily means that sporozoites were injected into the patients by the bites. He had cases in which no infection followed biting with one such batch of mosquitoes but did with subsequent batches.

In untreated tertian malaria there comes a time, usually between the eighth and tenth month after the date of the primary infection, when there is a definite recurrence of fever and reappearance of parasites in the peripheral blood. This recurrence may be followed by several recrudescences at short intervals, which usually end in what is called spontaneous recovery. He states that prior to this late recurrence the patient can be given a second and some times a third attack of malaria by reinfection with the same parasite, either by mosquito bites or by direct blood inoculation; but, after the recurrence and spontaneous recovery have taken place, efforts to bring on a fresh attack by reinfection with the same strain of parasite fail. This condition of immunity occurs only when each attack or relapse has been allowed to run its course for some time without quinine treatment. However, immunity to reinfection by one species confers no protection against the other two. This knowledge is valuable in the practice of malaria therapy, when it is desired to give patients who have become immune to benign tertian malaria a second or third course of treatment.

Also, complete immunity to re-infection by one strain of *P. vivax* does not confer protection; or only confers partial protection against another strain of the same species.

In the practice of malarial therapy, it is necessary to bring on the clinical malarial attack with as little delay as possible. This has prevented Colonel James from making an extensive study of the length of the incubation period.

Provided that patients have not suffered previously from malaria, he has never failed to bring on the desired attack; but sometimes a third and even a fourth reinfection has been necessary. He has, however, observations on twelve patients, who for various reasons were not subjected to reinfection when the primary attack was reported to have failed. The incubation periods varied from twenty-eight weeks and four days to forty-five weeks and two days, and he quotes similar records elsewhere. One case is very interesting. On July 28th, 1929, the patient was bitten by twenty mosquitoes infected with *P. vivax*. On the 20th of August, as there had been no reaction, the patient was given an intramuscular injection of 5 c.c. of quartan malarial blood. On the 15th of September she commenced a typical quartan fever which later changed to quotidian. She was allowed to have twenty-eight fever paroxysms over a period of two months, when the course was then terminated by quinine treatment for fifteen days. During the whole course of the fever blood examinations were made daily; quartan parasites were present in large numbers, but no benign tertian parasites were found. On the 4th of April, 1930, she had a slight attack of shivering at midday. On the 6th at 8 A.M. she had a severe rigor. *P. vivax* was found in large numbers, but no quartan parasites. She had three severe febrile paroxysms of typical tertian type. It then became necessary to terminate the course.

In this case the period of latency of the benign tertian infection was nine months; and it was unaffected by a long attack of quartan malaria followed by a curative course of quinine.

Colonel James calls a "recrudescence" a return of fever and parasite at any time within eight weeks after recovery from the primary attack; a "relapse," the same return later than eight weeks but earlier than twenty-four weeks after recovery from the primary attack; and a "recurrence" the same return later than twenty-four weeks after recovery from the primary attack, or about twenty-six weeks after the date of primary infection. His records show that of one hundred and fifty cases infected by mosquitoes, about one-half the total number of patients who have been treated with quinine have one or another of these subsequent manifestations, and about one-half have none.

He makes the very interesting observation that, in adults who have been infected with *P. vivax*, palpation of the spleen failed to give any information which would be useful to record.

Colonel James decided not to report his clinical observations on quartan malaria at this time as all of these were infected by direct blood inoculation. He reports one case of malignant tertian infection which began on the 15th of November and was treated with quinine, sometimes in considerable doses, until December 3rd, during all of which time the parasites were present in considerable amounts; and frequent tests of the urine showed that there was no failure to absorb the quinine.

With regard to prophylaxis by quinine the following interesting observations are recorded. The same results were obtained as those recorded by Yorke and Macfie in 1924. In cases infected by direct blood inoculation, the administration of ten grains of quinine shortly before inoculation and ten grains shortly afterwards is sufficient to prevent development of the infection. But, in the cases infected by mosquito bites, the result is quite different. The net result of these experiments was to show that no matter how much quinine is taken nor for how long a period, an attack of malaria would follow sooner or later. As long as the prophylactic quinine is taken daily, the clinical attack is suppressed or recurs only mildly. No immunity appears to be conferred. However, there is no doubt but that the use of prophylactic quinine enables work to be carried on over certain periods which otherwise would be impossible.

With respect to the treatment of benign tertian malaria, and indeed malaria in general, Colonel James is of the opinion that patients who are treated with quinine very early in the primary attack acquire little or no tolerance; and after each relapse is again treated on the first or second day, they often continue to relapse, or to recrudesce as he calls it, about every month for perhaps five or six months. There is a very great variation in individual tolerance against malaria. He believes that a few small doses of quinine given near the end of the course of the primary paroxysm cures 50% of the cases, and the others are cured by the same treatment during the recrudescence. This refers only to infection with benign tertian malaria. He considers it unjustifiable to withold quinine from a case, infected with *P. falciparum,* later than the first discovery of the parasites.

One reason why useful conclusions on treatment cannot be drawn from results obtained in cases following direct blood inoculation is that long interval relapses and recurrences were not observed after treatment. It is suggested that when infection is induced by blood inoculation only the forms of the parasite which live in red blood corpuscles are introduced; but when mosquito inoculation has been used, a form of the parasite is introduced which has always lived not in red blood corpuscles but in tissue cells—and it has not been depending on hemoglobin for nutriment. Evidently quinine has not the same action on the tissue parasite as it has on the ordinary forms in erythrocytes. Colonel James notes that Schaudinn's account of the entry of the sporozoites into red blood corpuscles is so clear and detailed as to admit of no question. (*It might help our actual knowledge if this experiment, made so many years ago, should be tested and confirmed by more of our expert workers today, as Professor Yorke has done. More than one observation of this kind concerning the pathogenic protozoa has been accepted on its face value, but could not be confirmed when others tried to do so. With all of the sporozoites available for biting experiments, in England and elsewhere, it should not be difficult to repeat so simple an observation.* W. M. J.) Colonel James cannot agree with the statements to the effect that cases of induced malaria are easily cured because they are primary cases and, therefore, presumably cases in which the disease is treated early in its course; nor does he follow the view that relapses are difficult to deal with because they are late manifestations occurring in persons who have not been treated earlier in their primary attacks, or who have been insufficiently treated with quinine in that attack of fever. He believes that the frequency, duration and severity of "relapses," (including recrudescences) depends on the amount of "tolerance" or "immunity" which the patient may have acquired during the primary attack and later. The after history of patients in whom the primary attack, and any recrudescenses which may follow it, are allowed to subside "spontaneously," is quite different from that of the patients in whom the attacks are treated on the first or second day. There are, however, patients in whom tolerance is difficult to acquire. He does not know of any plan of quinine treatment which will prevent recurrences in the cases which have been treated early in the primary attack. He cites the cases of two patients who had acquired accidental laboratory infection—one who had had much previous malaria, and one who had not had malaria previously. In each case quinine treatment was started as soon as the fever began and was taken daily while the attack lasted. The first case had eight relapses between August 8, 1928 and August 23, 1929. The other had 4 relapses between October 21, 1929 and April 5, 1930. He states that even large doses, 30 grains or more given at any time during the incubation period, have no effect; a large dose (15 grains) given on the first day of the attack has little effect; a single small dose, (5 grains) given in the middle of the course stops the fever almost at once and reduces parasites greatly, but there is a recrudescence within a fortnight; a small dose, (5 grains), given at or near the end of the course and repeated once a day for a few days cures 50% of the cases. He states, it is obvious that to follow out in general practice the principles indicated by these observations would mean a revolutionary change of existing plans of treatment. In this connection it must be noted that up to the present these observations are limited to benign tertain malaria. It would be unwise to assume that they apply equally to malignant tertian malaria or even to quartan malaria induced by mosquito bites. He states that very little is known about "relapse" in malignant tertian malaria, and that this disease is one with which no risk can be taken. As noted, he had twenty patients infected by direct blood inoculation with *P. falciparum*, two more who were infected by the bites of infected *maculipennis* fed on cases containing crescents in Rome, and still another who was infected by the bites of *maculipennis* caught in nature in a house in Italy and brought by him to England; but no details, except in one case, as to the treatment or subsequent relapses or recrudescences are given in the present paper. It is to be hoped that these details will appear later. Colonel James states that further studies in immunity are not for those who are studying induced malaria in Europe, but for those who are studying hyperendemic malaria in the tropics. He suggests that an intensive study of individual infants and children in a localized hyperendemic area should be made. This enquiry should start with the newly born, and each individual should be under continuous observation until the usual age of naturally acquired immunity is reached. Inter-current infections and infestations should also be studied, as well as when primary infection with each of the three species of parasites has occurred; and also when there may have been infection with a different strain of any of the three species. This, of course would be a herculean task; but it seems to the reviewer that the suggestion is eminently sound, and would involve no more work than that which is being done in censuses of Helminth infections and in making egg counts.

Even this lengthy review is not sufficiently comprehensive to bring out all of the important points made by Colonel James in his excellent paper. An animated discussion followed its reading. The previous work done by Yorke and Macfie on quinine prophylaxis had been confirmed, but Yorke and Macfie had found that if the daily dose of quinine was continued beyond ten and fourteen days after the infected mosquito bite, malaria did not develop. Professor Yorke stated that he himself had spent some weeks in trying to repeat Schaudinn's observations on the method of sporozoite penetration as described by Schaudinn, but without success. Yorke and Macfie advanced the following hypothesis: "*Quinine given to a patient whose blood contains numerous malaria parasites invariably destroys directly, or more probably indirectly, large numbers, but not all, of the parasites, thus setting free a considerable quantity of soluble antigen. The antigen promotes by stimulation of the host's tissues the formation of immune-body. The immune-body, if present in sufficient amount, destroys the remaining parasites, thus resulting in sterilization of the infection and in the cure of the patient.*" Dr. J. Gordon Thompson raised the point that Colonel James's experiments were not done on normal human beings and that the unknown influence of syphilis on the malaria parasites themselves must be considered. Colonel James replied that many of his patients, as well as those of Professor Yorke, did not have syphilis, and that the results were exactly the same in the syphilitics as in the non-syphilitics.

The reviewer would suggest to those who have not read this contribution of Colonel James, and the very interesting discussion which followed, by all means to do so. It brings to date the most important facts with regard to our knowledge of the incubation period, effective treatment, and relapses in infection with *P. vivax*. The only comment which the reviewer would make is that during the construction days of the Panama Canal much larger doses of quinine were given than appears to be the present custom in England. Today it is his custom to give at least 45 grains a day in any malarial infection until the fever has subsided. For many years he has followed carefully the blood in his hospital cases; and, since the publication by Macphail in the 1926 and 1927 Annual Reports of the Medical Department of the United Fruit Company on the occurrence of gametes during and after hospital treatment, has checked his cases by the thick film method to find the results of his treatment. These have been uniformly successful in controlling the infection and in causing the prompt disappearance of both sexual and asexual forms. He has abandoned the "tapering" method which he used formerly, and gives ten grains of quinine three times a day for a week after the cessation of the fever, and then a tonic of iron, quinine, strychnine and arsenic in the form of the well known Aiken's Tonic Pills for a month later. It appears to him that he has had no greater frequency of relapses.

To control a very severe infection with *P. falciparum*, in which, from the high percentage of infected erythrocytes, the frequency of multiple infection in the erythrocytes, and the severity of the vomiting and delirium, the life of the patient seems to be in imminent danger, he does not hesitate to use intravenous doses of

22 grains in 150 c.c. of normal salt solution twice in 24 hours until there is marked improvement; but this is clinical experience and perhaps has no place in a comparison with "control experiment" patients. Many of the points brought out by Colonel James, and also by the work of Yorke and Macfie, have caused the reviewer to feel as did Dr. P. A. Buxton, who concluded his discussion of Colonel James's paper by remarking what a pleasure it had been, though rather a bitter-sweet pleasure, to hear so stout an agnostic demolishing one's simple and ignorant faith.

W. M. JAMES.

Panama City, R. P.

SECTION VI

ORGANIZATION AND VITAL STATISTICS

SCOPE OF MEDICAL DEPARTMENT

Phases of the Work.—The Medical Department functions with respect to all conditions pertaining to the prevention of disease and the care of the sick and injured. This work embraces the following phases:

(a) In the Tropics, care of employees and their dependents; and of the habitants of communities within the limits of, or contiguous to, the plantations when no other medical service is available.

(b) On all the Company's steamships, care of passengers and members of the crews. Free radio-medical service is given to the Captains or Doctors aboard the steamers of any line, whenever professional advice is sought by radio.

(c) In the Domestic Divisions where the Company maintains medical staffs, dispensary service to employees.

(d) Physical examination of prospective salaried employees, and of all steamship crews before they leave the home port, each voyage.

(e) Supervision of all matters concerning quarantine and immigration affecting the Company's interests.

(f) In the Tropical Divisions, supervision and recommendation in all matters pertaining to sanitation.

(g) Sanitation of the Company's steamships.

For the effective performance of these many and varied duties, the Company maintains fully equipped hospitals and dispensaries in the Tropical Divisions, and dispensary service with sanitary staffs in the ports of New York, Boston and New Orleans.

PERSONNEL OF THE MEDICAL DEPARTMENT

Name	Title	Graduate of
W. E. Deeks, M.D., A.M.	General Manager, New York, N. Y.	McGill University Faculty of Medicine, Montreal, Quebec, Canada
R. C. Connor, M.D.	Assistant General Manager, New York, N. Y.	University of Texas School of Medicine, Galveston, Texas
J. S. Cudlipp	Assistant to General Manager, New York, N. Y.	
J. R. Ariza, M.D.	Consultant to the Cuban Divisions, Banes, Cuba	Havana University, Havana, Cuba
A. Castellani, M.D., C.M.G., F.R.C.P.	Consultant in Tropical Dermatology, London	Royal University of Florence Faculty of Medicine and Surgery, Italy University of Bonn Faculty of Medicine, Germany
H. C. Clark, M.D.	Consultant in Preventive Medicine, Tropical Pathology, and Laboratory Work, Panama, R. de P.	University of Pennsylvania School of Medicine, Philadelphia, Pa.
W. M. James, M.D.	Consultant in Tropical Medicine, Panama, R. de P.	University of Virginia Department of Medicine, Charlottesville, Va.

Name	Title	Graduate of
F. B. Mallory, M.D., A.B., A.M.	Consulting Pathologist, Boston, Mass.	Harvard University Medical School, Boston, Mass.
R. P. Strong, M.D.	Consultant in Laboratory and Medical Research Work, Boston, Mass.	Harvard University Medical School, Boston, Mass.
P. F. Murphy, M.D.	Port Medical Officer, New Orleans, La.	Tulane University of Louisiana School of Medicine, New Orleans, La.
L. R. Shearin, M.D.	Assistant to Port Medical Officer, New Orleans, La.	University of Tennessee College of Medicine, Memphis, Tenn.
J. M. Lawler, M.D.	Port Medical Officer, New York, N. Y.	Vanderbilt University School of Medicine, Nashville, Tenn.
J. A. Gatlin, M.D.	Sanitary Inspector, New York, N. Y.	Memphis Hospital Medical College, Memphis, Tenn.
F. X. Crawford, M.D.	Port Medical Officer, Boston, Mass.	Harvard University Medical School, Boston, Mass.
Harry Eno, M.D.	District Medical Officer, Cristobal, C. Z. (Samaritan Hospital)	Cornell University Medical College, New York, N. Y.
Carleton Hale	General Sanitary Inspector, New York, N. Y.	

BANES DIVISION

Name	Title	Graduate of
P. S. Malaret, M.D.	Assistant Superintendent Cuban Divisions	University of Pennsylvania School of Medicine, Philadelphia, Pa. (Medico-Chirurgical College)
A. F. Ruiz, M.D.	Assistant Surgeon	Universidad de la Habana Facultad de Medicina, Cuba.
J. M. de los Reyes, M.D.	Physician	Jefferson Medical College of Philadelphia, Philadelphia, Pa.
V. Bustillo, M.D.	District Medical Officer	Loyola University School of Medicine, Chicago, Ill.
J. C. Castellanos, M.D.	District Medical Officer	Tulane University of Louisiana School of Medicine, New Orleans, La.
Catharin Cotter, R.N.	Matron	Kings County Hospital School of Nursing, Brooklyn, N. Y.
Lillian Dixon, R.N.	Nurse	Hamilton General Hospital, Hamilton, Ontario, Canada
Florence Ehrentraut, R.N.	Nurse	Latrobe Hospital School of Nursing, Latrobe, Pa.
Francisca Archer, R.N.	Nurse	Public General Hospital, Kingston, Jamaica
Sibyl E. Chaplin, R.N.	Nurse	Public General Hospital, Kingston, Jamaica
Ivy L. Feres, R.N.	Nurse	Public General Hospital, Kingston, Jamaica

TOTAL NUMBER OF EMPLOYEES, OTHER THAN DOCTORS, REGISTERED NURSES, AND LABORATORY TECHNICIANS—31

CHIRIQUI LAND COMPANY

Name	Title	Graduate of
Manuel D. Rojas, M.D., Ph.C.	Superintendent	Tulane University of Louisiana School of Medicine, New Orleans, La. University of Michigan, Ann Arbor, Mich.
Wendell S. Dove, M.D., A.B.	Assistant Surgeon	University of Texas School of Medicine, Galveston, Texas
J. R. Maltsberger, A.B.	Laboratory Technician and Chief Sanitary Inspector	State University of Iowa, Iowa City, Iowa Naval Laboratory School
Helen Flanagan, R.N.	Matron	Massachusetts General Hospital School of Nursing, Boston, Mass.
Clara Totzke, G.N.	Nurse and X-Ray Technician	Hamburg-Eppendorf, Hamburg, Germany
Omaira de Echeverria, G.N.	Nurse	Santo Tomas Hospital School of Nursing, Panama, R. of P.

TOTAL NUMBER OF EMPLOYEES, OTHER THAN DOCTORS, REGISTERED NURSES, AND LABORATORY TECHNICIANS—24

Colombia Division

Name	Title	Graduate of
L. M. Drennan, M.D.	Superintendent	Georgetown University School of Medicine, Washington, D. C.
E. Thonnard-Neumann, M.D.	Physician and Assistant to Superintendent	University of Frankfort-am-Main, Faculty of Medicine, Frankfurt, Germany
J. Camacho, M.D.	Physician	Universidad de Valencia Facultad de Medicina, Spain
M. E. Duran, M.D.	Physician	Northwestern University Medical School, Chicago, Ill.
J. E. Llinas, M.D.	Physician	Universidad Nacional Facultad de Medicine, Bogota, Colombia
F. Valera, M.D.	District Medical Officer	Universidad de Valencia Facultad de Medicina, Spain
Octavio M. Tatis, G., M.D.	District Medical Officer	Universidad de Bolivar, Cartagena, Colombia
J. A. Fontalvo, M.D.	District Medical Officer	Universidad de Bolivar, Cartagena, Colombia
H. A. LeDoux	Laboratory Technician	
Martha W. Vessels, R.N.	Matron	Capital City School of Nursing, Washington, D. C.
Agnes K. Donegan, R.N.	Assistant Matron	Victoria Hospital, Yorkshire, England
Doris Melville, R.N.	Nurse	Public General Hospital, Kingston, Jamaica
Mabel M. Willis, R.N.	Nurse	Public General Hospital, Kingston, Jamaica
Gertrude L. Coore, R.N.	Nurse	Public General Hospital, Kingston, Jamaica
Gertrude E. Dunning, R.N.	Nurse	Bristol Royal Infirmary, Bristol, England
Lee Wood-Cahusac, R.N.	Nurse	Nuttall's Nursing Home, Crossroads, Jamaica
Ruby A. Fray, R.N.	Nurse	Nuttall's Nursing Home, Crossroads, Jamaica
Lillian H. Marshall, R.N.	Nurse	Nuttall's Nursing Home, Crossroads, Jamaica

Total Number of Employees, Other Than Doctors, Registered Nurses, and Laboratory Technicians—98

Cortes Development Company

Name	Title	Graduate of
F. C. Watson, M.D.	Superintendent	Vanderbilt University School of Medicine, Nashville, Tenn.
A. A. Ulloa, M.D.	Assistant Physician	Jefferson Medical College of Philadelphia, Philadelphia, Pa.
S. A. Macis, M.D.	Assistant Physician	University of Maryland School of Medicine, Baltimore, Maryland
R. A. Martinez, M.D.	Physician In Charge La Lima Hospital	St. Louis University Medical School, St. Louis, Mo.
M. Caceras Vijil, M.D.	Assistant Physician La Lima Hospital	Universidad de Honduras, Facultad de Medicinas, Tegucigalpa, Honduras
K. C. Brewster, B.S.	Bacteriologist	New Mexico College of Agriculture and Mech., N. M.
Johanna M. Brosnan, R.N.	Acting Matron	Hospital St. John and Elizabeth, London, England

Total Number of Employees, Other Than Doctors, Registered Nurses, and Laboratory Technicians—45

Compañia Bananera De Costa Rica

Name	Title	Graduate of
E. I. Salisbury, M.D., F.A.C.S.	Superintendent	Jefferson Medical College, Philadelphia, Pa.
A. A. Facio, M.D., F.A.C.S.	District Medical Officer	University of Pennsylvania School of Medicine (Medico-Chirurgical College), Philadelphia, Pa.
Juan M. Jimenez, M.D.	Physician	Jefferson Medical College, Philadelphia, Pa.

Name	Title	Graduate of
Curtis M. Roberts, M.D.	Physician	Northwestern University Medical School, Chicago, Ill.
Alberto Oreamuno, M.D.	Physician	Jefferson Medical College, Philadelphia, Pa.
A. Lachner Chacon, M.D.	District Medical Officer	University of Munchen Faculty of Medicine, Munich, Germany
Mary C. Walsh, R.N.	Matron	St. Joseph's Hospital School of Nursing, St. Paul, Minn.
Melva G. John, A.B., R.N.	Nurse	Denver University, Denver, Colorado St. Mary's Hospital School of Nursing, Rochester, Minn.
Nona Corbett, R.N.	Nurse	St. Mary's Hospital, Brooklyn, N.Y.
Thea Hoffmann, R.N.	Nurse	Koblenberg Stift Maydeburg, Germany
Josephine W. Shrine, R.N.	Nurse	Public General Hospital, Kingston, Jamaica

TOTAL NUMBER OF EMPLOYEES, OTHER THAN DOCTORS, REGISTERED NURSES, AND LABORATORY TECHNICIANS—96

GUATEMALA DIVISION

Name	Title	Graduate of
N. P. Macphail, M.D.	Superintendent	University of Aberdeen Faculty of Medicine, Scotland
R. Aguilar, M.D., D.D.S.	Surgeon	Universidad Central, Facultad de Medicina y Cirugia, Tegucigalpa, Honduras Strycher Dental School, New York, N. Y.
G. R. Harrod, M.D.	Assistant Physician	University of Louisville, School of Medicine, Louisville, Ky.
L. R. Matthews	Laboratory Technician	
Myra Ellerby, R.N.	Matron	Middlesex Hospital, London, England
Margaret A. Storrow, R.N.	Nurse	Cumberland Infirmary, Carlisle, England
Ethel Currant, R.N.	Nurse	Royal Waterloo and Seamen Hospital, London, England
Maria Sagastume, R.N.	Nurse	Hospital Americano, Guatemala City, Guatemala
Mariana Cordon, R.N.	Nurse	Hospital Americano, Guatemala City, Guatemala
Santos Brizuela, R.N.	Nurse	Hospital Americano, Guatemala City, Guatemala
Maria C. Martinez, R.N.	Nurse	Hospital Americano, Guatemala City, Guatemala
Hortencia Arevalo, R.N.	Nurse	Hospital Americano, Guatemala City, Guatemala

TOTAL NUMBER OF EMPLOYEES, OTHER THAN DOCTORS, REGISTERED NURSES, AND LABORATORY TECHNICIANS—102

JAMAICA DIVISION

Name	Title	Graduate of
I. W. McLean, M.D., F.A.C.S.	Superintendent	University of Maryland, Baltimore, Md.
J. G. Moseley, M.D., B.S., M.R.C.S., L.R.C.P.	District Physician	University of London, England
C. A. Moseley, M.D.	District Physician	University College Hospital Medical School, London, England
F. R. Evans, M.D.	District Physician	Bellevue Hospital Medical College, New York, N. Y.
A. C. Lushington, M.D., C.M., L.R.C.P. L.R.C.S., L.F.P. and S.	District Physician	University of Edinburgh and University of Glasgow, Scotland
L. B. Lyon, M.D., M.C.P. and S.	District Physician	University of Toronto, Ontario, Canada

TOTAL NUMBER OF EMPLOYEES, OTHER THAN DOCTORS, REGISTERED NURSES, AND LABORATORY TECHNICIANS—23

Panama Division

Name	Title	Graduate of
O. T. Brosius, M.D., D.T.M. and H., F.A.C.P.	Superintendent	Tufts College Medical School, Boston, Mass. London School of Tropical Medicine, London, England.
Mae A. Kenney, R.N.	Matron	Worcester City Hospital School of Nursing, Worcester, Mass.

Total Number of Employees, Other Than Doctors, Registered Nurses, and Laboratory Technicians—21

Preston Division

Name	Title	Graduate of
Jaime de la Guardia, M.D.	Superintendent, Cuban Divisions	Jefferson Medical College, Philadelphia, Pa.
T. de la Torre, M.D.	District Medical Officer	University of Maryland, Baltimore, Md.
Octavio Ortiz, M.D.	Physician	Havana University, Havana, Cuba
Cecilio A. Lecusay, M.D.	Physician	Havana University, Havana, Cuba
Wilhelm Cordes, M.D.	Bacteriologist and Roentgenologist	Marburg University, Germany
Matilda Baiz, R.N.	Matron	New York Post-Graduate Medical School and Hospital, New York, N.Y.
Julia Monahan, R.N.	Nurse	Lenox Hill Hospital, New York, N. Y.
Adelaide L. Bagni, R.N.	Nurse	Charles Choate Memorial Hospital, Woburn, Mass.
Margarita Hernandez, R.N.	Nurse	Santo Tomas Hospital Training School, Panama City, Panama
Catherine Clarke, R.N.	Nurse	Public General Hospital, Kingston, Jamaica
Lena Biggs, R.N.	Nurse	Public General Hospital, Kingston, Jamaica

Total Number of Employees, Other Than Doctors, Registered Nurses, and Laboratory Technicians—50

Tela Railroad Company

Name	Title	Graduate of
R. B. Nutter, M.D.	Superintendent	Tufts College Medical School, Boston, Mass.
E. J. Whitaker, M.D.	Physician	State University of Iowa College of Medicine, Iowa City, Iowa
A. E. Moure, M D.	Physician	Sorbonne Medical School, Paris, France
G. A. Izaguirre, M.D.	Physician	Syracuse University College of Medicine, Syracuse, N. Y.
J. C. McDaniel	Bacteriologist	
Betty Tomeny, R.N.	Matron	Charity Hospital School of Nursing, New Orleans, La.
Hildegard Hartman, R.N.	Nurse	Schassburg Hospital, Siebengurgen, Germany
Lila Maud Peart, G.N.	Nurse	Public General Hospital, Kingston, Jamaica

Total Number of Employees, Other Than Doctors, Registered Nurses, and Laboratory Technicians—81

Truxillo Railroad Company

Name	Title	Graduate of
B. M. Phelps, M.D.	Superintendent	Vanderbilt University School of Medicine, Nashville, Tenn.
Walter Jantzen, M.D.	Physician	University of Kiel Faculty of Medicine, Germany
L. R. Fletcher, M.D.	Physician	Rush Medical College (University of Chicago), Chicago, Ill.
Jose A. Lopez, M.D.	Physician	George Washington University Medical College, Washington, D. C.
Ida Pauls	Laboratory Technician	Institute of Bacteriology and Biology, Dresden, Koetzschenbroda
G. H. Robertson, R. N.	Matron	Sarah Leigh Hospital School of Nursing, Norfolk, Va.
Lilly McNeill, R.N.	Nurse	Wise Sanitarium, Plains, Ga.
America Ferrera, G.N.	Nurse	D'Antoni Hospital, La Ceiba, Honduras
Twila Phillips, G.N.	Nurse	D'Antoni Hospital, La Ceiba, Honduras

Total Number of Employees, Other Than Doctors, Registered Nurses, and Laboratory Technicians—75

SUMMARY OF WORK DON

	Banes Division		Chiriqui Land Co.		Colombia Division		Cia. Bananera Costa Rica	
	M.	F.	M.	F.	M.	F.	M.	F.
PERSONS DEPENDENT UPON THE MEDICAL DEPARTMENT FOR TREATMENT:								
Employees:								
From Temperate Zone	324	17	197	10	129	11	166	1
Others	4,920	104	3,072	130	6,519	280	4,699	32
Non-employees:								
From Temperate Zone	590	446	31	39	259	114	67	11
Others	9,690	11,323	372	774	5,428	5,225	2,710	3,94
Totals:	T.	O.	T.	O.	T.	O.	T.	O.
Employees	341	5,024	207	3,202	140	6,799	183	5,02
Non-employees	1,036	21,013	70	1,146	373	10,653	180	6,65
TOTAL	1,377	26,037	277	4,348	513	17,452	363	11,67
Passengers on steamships	–	–	–	–	–	–	–	–
Officers, crews and ships' laborers	–	–	–	–	–	–	–	–
TOTAL	–	–	–	–	–	–	–	–
GRAND TOTAL	–	–	–	–	–	–	–	–
PATIENTS TREATED IN HOSPITALS:								
Employees:	M.	F.	M.	F.	M.*	F.*	M.	F
From Temperate Zone	79	2	214	8	145	–	75	
Others	782	4	1,135	34	3,363	103	1,567	10
Non-employees:								
From Temperate Zone	4	19	27	16	48	15	50	2
Others	161	524	91	206	321	462	638	54
Totals:	T.	O.	T.	O.	T.	O.	T.	O.
Employees	81	786	222	1,169	145	3,466	76	1,67
Non-employees	23	685	43	297	63	783	72	1,18
GRAND TOTAL	104	1,471	265	1,466	208	4,249	148	2,85
TREATMENTS IN HOSPITAL DISPENSARIES:								
Employees:	M.	F.	M.	F.	M.	F.	M.	F.
From Temperate Zone	722	13	1,036	87	1,962	4	702	2
Others	16,433	167	5,190	425	45,204	1,601	12,261	1,68
Non-employees:								
From Temperate Zone	98	171	82	168	183	171	212	10
Others	7,305	13,833	288	1,088	1,706	3,765	1,972	2,29
Totals:	T.	O.	T.	O.	T.	O.	T.	O.
Employees	735	16,600	1,123	5,615	1,966	46,805	728	13,94
Non-employees	269	21,138	250	1,376	354	5,471	314	4,27
GRAND TOTAL	1,004	37,738	1,373	6,991	2,320	52,276	1,042	18,21
TREATMENTS IN FIELD DISPENSARIES:								
Employees:	M.	F.	M.	F.	M.	F.	M.	F
From Temperate Zone	–	–	475	–	97	–	120	
Others	–	–	16,286	102	18,407	1,135	18,134	78
Non-employees:								
From Temperate Zone	–	–	–	1	–	–	4	
Others	–	–	193	962	1	2	2,903	4,12
Totals:	T.	O.	T.	O.	T.	O.	T.	O.
Employees	–	–	475	16,388	97	19,542	121	18,91
Non-employees	–	–	1	1,155	–	3	5	7,02
GRAND TOTAL	–	–	476	17,543	97	19,545	126	25,93

* Including 50 patients treated in Line Hospitals.

AND VITAL STATISTICS

Guatemala Division		Jamaica Division		Panama Division		Preston Division		Tela Railroad		Truxillo Railroad		Semi-Totals		
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total
185	11	119	5	59	4	270	18	303	12	224	9	1,976	114	2,090
3,896	128	14,058	3,106	2,082	201	6,375	115	5,975	151	5,636	146	57,232	4,684	61,916
262	237	58	81	17	47	178	139	34	88	29	72	1,525	1,376	2,901
6,941	5,514	7,024	10,533	1,048	1,762	3,663	5,472	913	1,594	888	1,931	38,677	48,073	86,750
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	
196	4,024	124	17,164	63	2,283	288	6,490	315	6,126	233	5,782	2,090	61,916	64,006
499	12,455	139	17,557	64	2,810	317	9,135	122	2,507	101	2,819	2,901	86,750	89,651
695	16,479	263	34,721	127	5,093	605	15,625	437	8,633	334	8,601	4,991	148,666	153,657
–	–	–	–	–	–	–	–	–	–	–	–	–	–	46,685
–	–	–	–	–	–	–	–	–	–	–	–	–	–	28,528
–	–	–	–	–	–	–	–	–	–	–	–	–	–	75,213
–	–	–	–	–	–	–	–	–	–	–	–	–	–	228,870
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
120	5	31	–	18	1	120	6	153	1	144	7	1,099	31	1,130
1,730	59	28	4	393	38	1,083	18	2,739	16	2,717	44	15,537	425	15,962
146	53	8	–	8	6	34	47	98	92	46	20	469	290	759
857	380	–	–	95	159	179	440	419	929	324	758	3,085	4,404	7,489
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	
125	1,789	31	32	19	431	126	1,101	154	2,755	151	2,761	1,130	15,962	17,092
199	1,237	8	–	14	254	81	619	190	1,348	66	1,082	759	7,489	8,248
324	3,026	39	32	33	685	207	1,720	344	4,103	217	3,843	1,889	23,451	25,340
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
716	14	744	30	471	48	1,133	3	2,356	261	1,311	109	11,153	595	11,748
3,137	153	8,962	2,429	3,982	738	10,029	202	13,331	592	8,625	285	127,154	8,277	135,431
207	391	298	129	59	153	60	191	1,075	1,124	566	281	2,840	2,881	5,721
533	616	1,631	1,581	814	1,341	3,298	5,923	2,990	6,201	1,583	2,794	22,120	39,441	61,561
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	
730	3,290	774	11,391	519	4,720	1,136	10,231	2,617	13,923	1,420	8,910	11,748	135,431	147,179
598	1,149	427	3,212	212	2,155	251	9,221	2,199	9,191	847	4,377	5,721	61,561	67,282
1,328	4,439	1,201	14,603	731	6,875	1,387	19,452	4,816	23,114	2,267	13,287	17,469	196,992	214,461
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
678	49	237	1	109	2	–	–	617	–	83	–	2,416	53	2,469
1,236	607	10,751	3,390	2,365	307	–	–	21,356	93	13,003	40	111,538	6,456	117,994
134	124	–	14	6	13	–	–	4	18	–	–	148	171	319
2,140	1,897	436	560	33	188	–	–	362	1,081	673	1,146	6,741	9,956	16,697
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	
727	11,843	238	14,141	111	2,672	–	–	617	21,449	83	13,043	2,469	117,994	120,463
258	4,037	14	996	19	221	–	–	22	1,443	–	1,819	319	16,697	17,016
985	15,880	252	15,137	130	2,893	–	–	639	22.892	83	14,862	2,788	134,691	137,479

SUMMARY OF WORK DONE

	Banes Division		Chiriqui Land Co.		Colombia Division		Cia. Bananera Costa Rica	
	M.	F.	M.	F.	M.	F.	M.	F.
Total Number of Treatments in Hospital Dispensaries and Field Dispensaries:								
Employees:								
From Temperate Zone	722	13	1,511	87	2,059	4	822	27
Others	16,433	167	21,476	527	63,611	2,736	30,395	2,467
Non-employees:								
From Temperate Zone	98	171	82	169	183	171	216	103
Others	7,305	13,833	481	2,050	1,707	3,767	4,875	6,419
Totals:	T.	O.	T.	O.	T.	O.	T.	O.
Employees	735	16,600	1,598	22,003	2,063	66,347	849	32,862
Non-employees	269	21,138	251	2,531	354	5,474	319	11,294
Grand Total	1,004	37,738	1,849	24,534	2,417	71,821	1,168	44,156
Number of Hospital Days:								
Employees:	M.	F.	M.	F.	M.*	F.*	M.	F.
From Temperate Zone	739	12	1,372	57	1,532	–	840	4
Others	10,403	35	10,632	187	47,339	1,195	29,911	1,351
Non-employees:								
From Temperate Zone	20	197	153	102	988	224	1,603	299
Others	2,020	4,790	546	1,173	5,382	5,908	6,949	5,911
Totals:	T.	O.	T.	O.	T.	O.	T.	O.
Employees	751	10,438	1,429	10,819	1,532	48,534	844	31,262
Non-employees	217	6,810	255	1,719	1,212	11,290	1,902	12,860
Grand Total	968	17,248	1,684	12,538	2,744	59,824	2,746	44,122
Number of Treatments Aboard Passenger Steamships	–	–	–	–	–	–	–	–
Number of Treatments by Port Medical Officers	–	–	–	–	–	–	–	–
Number of Seamen and Applicants Examined by Port Medical Officers	–	–	–	–	–	–	–	–
Deaths, Hospitals:								
Employees:								
From Temperate Zone	4		1		2		2	
Others	24		38		47‡		56	
Non-employees:								
From Temperate Zone	–		1		1		1	
Others	37		18		31		76	
Totals:								
Employees	28		39		49		58	
Non-employees	37		19		32		77	
Grand Total	65		58		81		135	
Deaths, Hospital Dispensaries:								
Employees:								
From Temperate Zone	–		–		–		–	
Others	7		2		–		3	
Non-employees:								
From Temperate Zone	1		–		–		–	
Others	32		1		5		15	
Totals:								
Employees	7		2		–		3	
Non-employees	33		1		5		15	
Grand Total	40		3		5		18	

* Including 128 days in Line Hospitals.
† Including 3,289 days in Sick Camps.
‡ Including 2 deaths in Line Hospitals.

AND VITAL STATISTICS—*Continued*

Guatemala Division		Jamaica Division		Panama Division		Preston Division		Tela Railroad		Truxillo Railroad		Semi-Totals		
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total
1,394	63	981	31	580	50	1,133	3	2,973	261	1,394	109	13,569	648	14,217
14,373	760	19,713	5,819	6,347	1,045	10,029	202	34,687	685	21,628	325	238,692	14,733	253,425
341	515	298	143	65	166	60	191	1,079	1,142	566	281	2,988	3,052	6,040
2,673	2,513	2,067	2,141	847	1,529	3,298	5,923	3,352	7,282	2,256	3,940	28,861	49,397	78,258
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	
1,457	15,133	1,012	25,532	630	7,392	1,136	10,231	3,234	35,372	1,503	21,953	14,217	253,425	267,642
856	5,186	441	4,208	231	2,376	251	9,221	2,221	10,634	847	6,196	6,040	78,258	84,298
2,313	20,319	1,453	29,740	861	9,768	1,387	19,452	5,455	46,006	2,350	28,149	20,257	331,683	351,940
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
1,173	50	386	–	220	5	1,065	33	1,752	12	998	23	10,077	196	10,273
19,777†	616	262	14	4,684	298	15,124	168	43,061	171	24,287	2,041	205,480	6,076	211,556
1,416	428	74	–	122	38	332	453	2,043	1,734	791	176	7,542	3,651	11,193
10,514	3,072	–	–	1,183	1,270	1,746	3,673	4,837	6,438	4,327	4,694	37,504	36,929	74,433
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	
1,223	20,393	386	276	225	4,982	1,098	15,292	1,764	43,232	1,021	26,328	10,273	211,556	221,829
1,844	13,586	74	–	160	2,453	785	5,419	3,777	11,275	967	9,021	11,193	74,433	85,626
3,067	33,979	460	276	385	7,435	1,883	20,711	5,541	54,507	1,988	35,349	21,466	285,989	307,455
–	–	–	–	–	–	–	–	–	–	–	–	–	–	12,639
–	–	–	–	–	–	–	–	–	–	–	–	–	–	11,644
–	–	–	–	–	–	–	–	–	–	–	–	–	–	31,401
1		–		–		–		2		2				14
38		–		24		30		47		64				368
6		1		–		1		4		1				16
38		–		12		33		49		58				352
39		–		24		30		49		66				382
44		1		12		34		53		59				368
83		1		36		64		102		125				750
–		–		–		–		1		–				1
–		9		–		1		–		–				22
–		–		–		–		–		–				1
–		3		1		25		–		–				82
–		9		–		1		1		–				23
–		3		1		25		–		–				83
–		12		1		26		1		–				106

SUMMARY OF WORK DONE

	Banes Division	Chiriqui Land Co.	Colombia Division	Cia. Bananera Costa Rica
	M. F.	M. F.	M. F.	M. F.
†DEATHS, FIELD DISPENSARIES:				
Employees:				
From Temperate Zone	–	–	–	–
Others	–	7	2	6
Non-employees:				
From Temperate Zone	–	–	–	–
Others	–	3	–	6
Totals:				
Employees	–	7	2	6
Non-employees	–	3	–	6
GRAND TOTAL	–	10	2	12
DEATHS, HOSPITALS AND ALL DISPENSARIES COMBINED:				
Employees:				
From Temperate Zone	4	1	2	2
Others	31	47	49	65
Non-employees:				
From Temperate Zone	1	1	1	1
Others	69	22	36	97
Totals:				
Employees	35	48	51	67
Non-employees	70	23	37	98
GRAND TOTAL	105	71	88	165
DEATHS, STEAMSHIP SERVICE:				
Passengers	–	–	–	–
Officers, crews and ships' laborers	–	–	–	–
TOTAL	–	–	–	–
GRAND TOTAL—DEATHS AMONG PERSONS DEPENDENT ON THE COMPANY FOR TREATMENT: (Steamship service included)	–	–	–	–
REPATRIATIONS:				
Employees:				
From Temperate Zone	–	–	1	–
Others	3	12	39	4
Non-employees:				
From Temperate Zone	–	–	–	–
Others	–	–	–	–
Totals:				
Employees	3	12	40	4
Non-employees	–	–	–	–
GRAND TOTAL	3	12	40	4
AVERAGE DAILY NUMBER OF PATIENTS IN HOSPITALS:				
Employees:				
From Temperate Zone	2.02	3.85	4.13	2.27
Others	28.14	29.16	130.82	84.27
Non-employees:				
From Temperate Zone	.58	.69	3.27	5.13
Others	18.36	4.63	30.43	34.66
Totals:				
Employees	30.16	33.01	134.95	86.54
Non-employees	18.94	5.32	33.70	39.79
GRAND TOTAL	49.10	38.33	168.65	126.33

* See Explanatory Notes on page 275.

† Including "Other Deaths"—See appendix of table, on pages 214-215.

AND VITAL STATISTICS—*Continued*

Guatemala Division M F	Jamaica Division M. F.	Panama Division M. F.	Preston Division M. F.	Tela Railroad M. F.	Truxillo Railroad M. F.	*Total, Excluding Jamaica Division M. F.	Total
–	–	–	1	1	1		3
2	7	1	7	1	44		77
–	–	–	2	–	–		2
5	–	7	41	–	14		76
2	7	1	8	2	45		80
5	–	7	43	–	14		78
7	7	8	51	2	59		158
1	–	–	1	4	3		18
40	16	25	38	48	108		467
6	1	–	3	4	1		19
43	3	20	99	49	72		510
41	16	25	39	52	111		485
49	4	20	102	53	73		529
90	20	45	141	105	184		1,014
–	–	–	–	–	–		1
–	–	–	–	–	–		–
–	–	–	–	–	–		1
–	–	–	–	–	–		1,015
–	–	–	–	–	–		1
–	–	6	–	4	–		68
–	–	–	–	–	–		–
–	–	1	–	–	–		1
–	–	6	–	4	–		69
–	–	1	–	–	–		1
–	–	7	–	4	–		70
3.30	1.04	.61	2.96	4.75	2.75	26.65	27.69
54.96	.74	13.43	41.22	116.53	70.97	569.49	570.23
4.97	.20	.43	2.12	10.18	2.61	29.97	30.17
36.62	–	6.61	14.60	30.39	24.31	200.63	200.63
58.26	1.78	14.04	44.18	121.28	73.72	596.14	597.92
41.59	.20	7.04	16.72	40.57	26.92	230.60	230.80
99.85	1.98	21.08	60.90	161.85	100.64	826.74	828.72

SUMMARY OF WORK DONE

	Banes Division	Chiriqui Land Co.	Colombia Division	Cia. Bananera Costa Rica
	M. F.	M. F.	M. F.	M. F.
AVERAGE DAILY NUMBER OF TREATMENTS IN HOSPITAL DISPENSARIES AND FIELD DISPENSARIES:				
Employees:				
From Temperate Zone	1.98	4.31	5.56	2.29
Others	44.74	59.30	178.83	88.58
Non-employees:				
From Temperate Zone	.73	.68	.95	.86
Others	56.98	6.82	14.76	30.44
Totals:				
Employees	46.72	63.61	184.39	90.87
Non-employees	57.71	7.50	15.71	31.30
GRAND TOTAL	104.43	71.11	200.10	122.17
DEATH RATE PER THOUSAND EMPLOYEES:				
From Temperate Zone	11.73	4.83	14.29	10.93
Others	6.17	14.68	7.21	12.94
TOTAL	6.52	14.08	7.35	12.87
AVERAGE NUMBER OF HOSPITAL DAYS ANNUALLY, PER EMPLOYEE:				
From Temperate Zone	2.20	6.90	10.94	4.61
Others	2.08	3.38	7.14	6.23
TOTAL	2.09	3.59	7.22	6.17
HOSPITAL ADMISSION RATE ANNUALLY, PER THOUSAND EMPLOYEES:				
From Temperate Zone	238	1,072	1,036	415
Others	156	365	510	333
TOTAL	162	408	520	336
AVERAGE NUMBER DISPENSARY TREATMENTS ANNUALLY, PER EMPLOYEE:				
From Temperate Zone	2.16	7.72	14.74	4.64
Others	3.30	6.87	9.76	6.54
TOTAL	3.23	6.92	9.86	6.48
AVERAGE NUMBER OF EMPLOYEES NON-EFFECTIVE, PER THOUSAND EMPLOYEES:				
From Temperate Zone	5.92	18.60	29.50	12.40
Others	5.60	9.11	19.24	16.78
TOTAL	5.62	9.68	19.45	16.63
AVERAGE NUMBER OF EMPLOYEES PARTIALLY NON-EFFECTIVE PER THOUSAND EMPLOYEES:				
From Temperate Zone	5.81	20.82	39.71	12.51
Others	8.91	18.52	26.30	17.63
TOTAL	8.71	18.66	26.57	17.46

* See Explanatory Notes on page 275.

AND VITAL STATISTICS—*Concluded*

Guatemala Division	Jamaica Division	Panama Division	Preston Division	Tela Railroad	Truxillo Railroad	*Total, Excluding Jamaica Division	Total
M. F.	M. F.	M. F.	M. F.	M. F.	M. F.	M. F.	
3.93	2.73	1.70	3.06	8.72	4.05	35.59	38.32
40.79	68.82	19.92	27.58	95.34	59.17	614.27	683.09
2.31	1.19	.62	.68	5.99	2.28	15.09	16.28
13.97	11.34	6.41	24.85	28.66	16.70	199.60	210.94
44.72	71.55	21.62	30.64	104.06	63.22	649.86	721.41
16.28	12.53	7.03	25.53	34.65	18.98	214.69	227.22
61.00	84.08	28.65	56.17	138.71	82.20	864.55	948.63
5.10	–	–	3.47	12.70	12.88	9.65	8.61
9.94	.93	10.95	5.86	7.84	18.68	10.08	7.54
9.72	.93	10.66	5.75	8.07	18.45	10.04	7.58
6.24	3.11	3.57	3.81	5.60	4.38	5.03	4.92
5.07	.02	2.18	2.36	7.06	4.55	4.72	3.42
5.12	.04	2.22	2.42	6.99	4.55	4.73	3.47
638	250	302	438	489	648	559	541
445	2	189	170	450	478	356	258
454	4	192	181	452	484	365	267
7.43	8.16	10.00	3.94	10.27	6.45	6.72	6.80
3.76	1.49	3.24	1.58	5.77	3.80	5.09	4.09
3.93	1.54	3.42	1.68	5.99	3.90	5.16	4.18
16.84	8.39	9.68	10.28	15.08	11.80	13.56	13.25
13.66	.04	5.88	6.35	19.02	12.27	12.73	9.21
13.81	.10	5.98	6.52	18.83	12.26	12.76	9.34
20.05	22.02	26.98	10.63	27.68	17.38	18.10	18.33
10.14	4.01	8.73	4.25	15.56	10.23	13.73	11.03
10.59	4.14	9.22	4.52	16.16	10.51	13.91	11.27

RECORD OF

			Banes Division		Chiriqui Land Co.		*Colombia Division		Cia. Bananera Costa Rica	
			T.	O.	T.	O.	T.	O.	T.	O.
Remaining from last year	Emp.	M.	1	20	5	21	3	111	1	71
		F.	–	–	–	–	–	4	–	2
	Non-emp.	M.	1	5	–	–	3	18	2	23
		F.	–	10	–	2	–	10	1	11
Admitted this year	Emp.	M.	78	762	209	1,114	142	3,252	74	1,496
		F.	2	4	8	34	–	99	1	103
	Non-emp.	M.	3	156	27	91	45	303	48	615
		F.	19	514	16	204	15	452	21	535
Discharged	Emp.	M.	79	762	211	1,114	143	3,279	72	1,510
		F.	2	4	8	33	–	103	1	103
	Non-emp.	M.	4	157	27	91	48	309	47	612
		F.	19	510	16	202	14	447	21	528
Remaining	Emp.	M.	–	20	3	21	2	84	3	57
		F.	–	–	–	1	–	–	–	2
	Non-emp.	M.	–	4	–	–	–	12	3	26
		F.	–	14	–	4	1	15	1	18
Died	Emp.		4	24	1	38	2	47	2	56
	Non-emp.		–	37	1	18	1	31	1	76
Repatriated	Emp.		–	3	–	10	1	37	–	4
	Non-emp.		–	–	–	–	–	–	–	–
Total number of hospital days	Emp.	M.	739	10,403	1,372	10,632	1,532	47,339	840	29,911
		F.	12	35	57	187	–	1,195	4	1,351
	Non-emp.	M.	20	2,020	153	546	988	5,382	1,603	6,949
		F.	197	4,790	102	1,173	224	5,908	299	5,911
Operations with general anesthesia	Emp.		5	74	4	32	1	19	2	52
	Non-emp.		7	225	8	11	2	36	16	61
Operations with or without local anesthesia	Emp.		5	490	77	963	39	2,111	36	1,913
	Non-emp.		5	90	30	146	35	540	148	733

* Including Line Hospitals.
† Excluding 3,289 days in Sick Camps.

HOSPITALS

Guatemala Division		Jamaica Division		Panama Division		Preston Division		Tela Railroad		Truxillo Railroad		Semi-Totals		
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total
3	49	1	1	–	11	8	31	7	99	1	80	30	494	524
–	4	–	–	–	2	–	1	–	–	–	4	–	17	17
2	23	1	–	1	3	–	7	4	3	4	8	18	90	108
2	4	–	–	–	6	–	12	1	18	1	10	5	83	88
117	1,681	30	27	18	382	112	1,052	146	2,640	143	2,637	1,069	15,043	16,112
5	55	–	4	1	36	6	17	1	16	7	40	31	408	439
144	834	7	–	7	92	34	172	94	416	42	316	451	2,995	3,446
51	376	–	–	6	153	47	428	91	911	19	748	285	4,321	4,606
119	1,689	31	27	17	380	120	1,058	152	2,641	138	2,675	1,082	15,135	16,217
5	59	–	4	1	37	6	18	1	16	7	40	31	417	448
141	843	8	–	7	92	33	179	86	394	46	303	447	2,980	3,427
53	374	–	–	6	156	46	433	89	923	20	743	284	4,316	4,600
1	41	–	1	1	13	–	25	1	98	6	42	17	402	419
–	–	–	–	–	1	–	–	–	–	–	4	–	8	8
5	14	–	–	1	3	1	–	12	25	–	21	22	105	127
–	6	–	–	–	3	1	7	3	6	–	15	6	88	94
1	38	–	–	–	24	–	30	2	47	2	64	14	368	382
6	38	1	–	–	12	1	33	4	49	1	58	16	352	368
–	–	–	–	–	5	–	–	–	4	–	–	1	63	64
–	–	–	–	–	1	–	–	–	–	–	–	–	1	1
,173	16,488†	386	262	220	4,684	1,065	15,124	1,752	43,061	998	24,287	10,077	202,191	212,268
50	616	–	14	5	298	33	168	12	171	23	2,041	196	6,076	6,272
,416	10,514	74	–	122	1,183	332	1,746	2,043	4,837	791	4,327	7,542	37,504	45,046
428	3,072	–	–	38	1,270	453	3,673	1,734	6,438	176	4,694	3,651	36,929	40,580
21	133	1	4	1	33	9	129	11	49	2	146	57	671	728
32	90	–	–	1	23	28	208	10	65	8	56	112	775	887
6	196	–	–	1	138	40	881	53	1,051	32	864	289	8,607	8,896
4	95	–	–	–	70	6	144	39	529	58	278	325	2,625	2,950

RECORD OF

			Banes Division		Chiriqui Land Co.		Colombia Division		Cia. Bananera Costa Rica	
			T.	O.	T.	O.	T.	O.	T.	O.
Number of treatments administered	Emp.	M.	722	16,433	1,036	5,190	1,962	45,204	702	12,261
		F.	13	167	87	425	4	1,601	26	1,685
	Non-emp.	M.	98	7,305	82	288	183	1,706	212	1,972
		F.	171	13,833	168	1,088	171	3,765	102	2,299
Patients sent to hospitals	Emp.	M.	78	762	174	902	128	2,632	44	401
		F.	2	4	5	27	–	83	1	19
	Non-emp.	M.	3	156	21	72	45	296	45	444
		F.	19	514	10	158	15	449	16	436
Visits to lodgings	Emp.	M.	21	104	–	–	23	175	90	502
		F.	–	–	–	–	–	32	–	96
	Non-emp.	M.	1	100	–	–	16	13	19	65
		F.	5	141	5	–	30	15	40	103
Operations with general anesthesia	Emp.		–	–	–	–	–	–	–	4
	Non-emp.		–	–	2	1	–	4	–	5
Operations with or without local anesthesia	Emp.		122	1,884	326	2,353	42	1,293	173	3,476
	Non-emp.		67	4,934	68	527	23	324	49	1,000
Died	Emp.		–	7	–	2	–	–	–	3
	Non-emp.		1	32	–	1	–	5	–	15
Repatriated	Emp.		–	–	–	2	–	2	–	–
	Non-emp.		–	–	–	–	–	–	–	–

IOSPITAL DISPENSARIES

Guatemala Division		Jamaica Division		Panama Division		Preston Division		Tela Railroad		Truxillo Railroad		Semi-Totals		
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total
716	3,137	744	8,962	471	3,982	1,133	10,029	2,356	13,331	1,311	8,625	11,153	127,154	138,307
14	153	30	2,429	48	738	3	202	261	592	109	285	595	8,277	8,872
207	533	298	1,631	59	814	60	3,298	1,075	2,990	566	1,583	2,840	22,120	24,960
391	616	129	1,581	153	1,341	191	5,923	1,124	6,201	281	2,794	2,881	39,441	42,322
117	1,681	29	28	18	382	112	1,080	142	967	143	2,637	985	11,472	12,457
5	55	–	4	1	36	6	17	1	10	7	40	28	295	323
144	834	7	–	7	69	34	172	94	374	42	316	442	2,733	3,175
51	376	–	–	6	130	47	429	91	693	19	748	274	3,933	4,207
–	1	107	289	–	–	11	35	39	180	9	–	300	1,286	1,586
1	4	15	99	–	–	–	–	32	42	2	–	50	273	323
–	–	54	21	–	–	–	29	75	87	7	–	172	315	487
3	6	34	84	–	–	14	52	133	115	12	–	276	516	792
–	–	–	–	–	–	–	–	–	–	–	–	–	4	4
–	–	–	–	1	–	–	–	–	–	–	–	3	10	13
20	577	11	483	9	926	118	1,550	135	651	81	838	1,037	14,031	15,068
4	73	12	1,582	1	208	20	530	226	350	87	668	557	10,196	10,753
–	–	–	9	–	–	–	1	1	–	–	–	1	22	23
–	–	–	3	–	1	–	25	–	–	–	–	1	82	83
–	–	–	–	–	1	–	–	–	–	–	–	–	5	5
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

RECORD OF

			Banes Division		Chiriqui Land Co.		Colombia Division		Cia. Bananera Costa Rica	
			T.	O.	T.	O.	T.	O.	T.	O.
Number of treatments administered	Emp.	M.	–	–	475	16,286	97	18,407	120	18,134
		F.	–	–	–	102	–	1,135	1	782
	Non-emp.	M.	–	–	–	193	–	1	4	2,903
		F.	–	–	1	962	–	2	1	4,120
Number of surgical treatments	Emp.	M.	–		5,367		6,440		5,206	
		F.	–		11		457		114	
	Non-emp.	M.	–		35		–		463	
		F.	–		217		–		632	
Total number surgical treatments			–		5,630		6,897		6,415	
Number of medical treatments	Emp.	M.	–		11,394		12,064		13,048	
		F.	–		91		678		669	
	Non-emp.	M.	–		158		1		2,444	
		F.	–		746		2		3,489	
Total number of medical treatments			–		12,389		12,745		19,650	
GRAND TOTAL			–		18,019		19,642		26,065	
Patients sent to hospitals	Emp.	M.	–	–	58	804	14	576	30	1,095
		F.	–	–	–	4	–	16	–	84
	Non-emp.	M.	–	–	1	15	–	1	3	171
		F.	–	–	–	89	–	3	5	99
Visits to lodgings	Emp.	M.	–		2,314		197		1,716	
		F.	–		36		76		80	
	Non-emp.	M.	–		20		11		64	
		F.	–		480		19		679	
Died	Emp.		–	–	–	1	–	2	–	1
	Non-emp.		–	–	–	1	–	–	–	3

NOTE.—The Banes Division and the Preston Division did not operate any Field Dispensaries during the year 1930.

FIELD DISPENSARIES

Guatemala Division		Jamaica Division		Panama Division		Preston Division		Tela Railroad		Truxillo Railroad		Semi-Totals		
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total
678	11,236	237	10,751	109	2,365	–	–	617	21,356	83	13,003	2,416	111,538	113,954
49	607	1	3,390	2	307	–	–	–	93	–	40	53	6,456	6,509
134	2,140	–	436	6	33	–	–	4	362	–	673	148	6,741	6,889
124	1,897	14	560	13	188	–	–	18	1,081	–	1,146	171	9,956	10,127
3,810		2,954		664		–		5,858		4,250				34,549
112		812		70		–		24		4				1,604
560		55		10		–		126		190				1,439
383		94		48		–		408		216				1,998
4,865		3,915		792		–		6,416		4,660				39,590
8,104		8,034		1,810		–		16,115		8,836				79,405
544		2,579		239		–		69		36				4,905
1,714		381		29		–		240		483				5,450
1,638		480		153		–		691		930				8,129
12,000		11,474		2,231		–		17,115		10,285				97,889
16,865		15,389		3,023		–		23,531		14,945				137,479
13	315	–	87	–	783	–	–	2	1,677	1	491	118	5,828	5,946
1	7	–	22	–	279	–	–	–	6	–	1	1	419	420
–	21	–	–	1	52	–	–	–	40	–	–	5	300	305
1	38	–	1	2	179	–	–	–	218	–	23	8	650	658
1,202		773		125		–		24		3,896				10,247
126		124		27		–		12		27				508
568		16		15		–		13		552				1,259
482		36		74		–		35		911				2,716
–	–	–	7	–	1	–	–	–	1	–	–	–	13	13
–	–	–	–	–	3	–	–	–	–	–	–	–	7	7

DEATHS BY AGE,

Age and Sex:		Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
		T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.
Under 1 year	M. . .	–	–	–	12	–	–	–	7	–	–	–	3	–	–	–	9	–	–	–	–
	F. . .	–	–	–	12	–	–	–	1	–	–	–	2	–	–	–	8	–	–	–	3
1 to 5 years	M. . .	–	–	–	4	–	–	–	4	–	–	–	3	–	–	–	7	–	–	–	3
	F. . .	–	–	–	10	–	–	–	–	–	–	–	2	–	–	–	3	–	–	1	2
6 to 10 years	M. . .	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	2	–	–	–	2
	F. . .	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	3
11 to 20 years	M. . .	–	1	–	3	–	9	–	–	–	2	–	2	–	3	–	2	–	6	–	5
	F. . .	–	–	–	6	–	–	–	1	–	–	–	1	–	–	–	3	–	–	–	6
21 to 30 years	M. . .	1	9	–	–	–	23	1	2	2	15	1	5	–	11	–	7	–	17	–	3
	F. . .	–	–	1	6	–	–	–	1	–	–	–	2	–	–	–	4	–	–	–	5
31 to 40 years	M. . .	2	7	–	–	–	7	–	1	–	14	–	4	–	9	–	12	1	13	–	4
	F. . .	–	–	–	4	–	–	–	1	–	–	–	4	–	–	–	4	–	–	–	2
41 to 50 years	M. . .	1	8	–	–	1	5	–	3	–	8	–	2	1	16	–	10	–	3	1	1
	F. . .	–	–	–	4	–	–	–	–	–	–	–	3	–	1	–	–	–	–	–	1
51 to 60 years	M. . .	–	4	–	1	–	3	–	1	–	5	–	1	1	16	1	8	–	1	3	1
	F. . .	–	–	–	1	–	–	–	–	–	–	–	–	–	1	–	5	–	–	–	–
61 to 70 years	M. . .	–	–	–	1	–	–	–	–	–	3	–	–	–	7	–	5	–	–	1	1
	F. . .	–	–	–	1	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–
Over 70 years	M. . .	–	2	–	–	–	–	–	–	–	–	–	–	–	1	–	3	–	–	–	1
	F. . .	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–
Unknown or Unstated	M. . .	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	3	–	–	–	–
	F. . .	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
SEMI-TOTALS	M. . .	4	31	–	21	1	47	1	18	2	49	1	21	2	63	1	68	1	40	5	21
	F. . .	–	–	1	48	–	–	–	4	–	–	–	15	–	2	–	29	–	–	1	22
TOTALS		4	31	1	69	1	47	1	22	2	49	1	36	2	65	1	97	1	40	6	43

APPENDIX

Deaths, Hospitals . . .	4	24	–	37	1	38	1	18	2	47	1	31	2	56	1	76	1	38	6	38
Deaths, Hospital Dispensaries	–	7	1	32	–	2	–	1	–	–	–	5	–	3	–	15	–	–	–	–
Deaths, Field Dispensaries	–	–	–	–	–	1	–	1	–	2	–	–	–	1	–	3	–	–	–	–
*Deaths, Others	–	–	–	–	–	6	–	2	–	–	–	–	–	5	–	3	–	2	–	5

* Deaths occurring within the Company's property, of persons who did not receive medical attendance.

NATIVITY AND SEX

Jamaica Division				Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-Totals				
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total
–	–	–	1	–	–	–	–	–	–	–	21	–	–	–	4	–	–	–	7	–	–	–	64	64
–	–	–	1	–	–	–	–	–	–	1	17	–	–	1	3	–	–	–	6	–	–	2	53	55
–	–	–	–	–	–	–	3	–	–	–	7	–	–	–	4	–	–	–	2	–	–	–	37	37
–	–	–	1	–	–	–	2	–	–	–	8	–	–	–	7	–	–	–	6	–	–	1	41	42
–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	8	8
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	3	–	–	–	12	12
–	–	–	–	–	1	–	–	–	–	–	1	–	7	–	4	–	8	–	2	–	37	–	19	56
–	–	–	–	–	–	–	2	–	–	–	9	–	–	–	1	–	–	–	2	–	–	–	31	31
–	3	–	–	–	6	–	1	1	12	–	4	2	23	–	1	2	38	–	5	8	157	2	28	195
–	3	–	–	–	–	–	3	–	–	–	8	–	–	–	8	–	1	–	8	–	4	1	45	50
–	4	–	–	–	3	–	2	–	13	–	1	–	11	–	2	–	9	–	3	3	90	–	29	122
–	–	–	–	–	–	–	–	–	–	–	7	–	–	1	7	–	–	–	5	–	–	1	34	35
–	2	–	–	–	4	–	1	–	7	–	–	–	5	1	2	–	5	1	2	3	63	3	21	90
–	–	–	–	–	1	–	2	–	–	–	4	–	–	–	–	–	–	–	3	–	2	–	17	19
–	2	1	–	–	6	–	–	–	5	–	1	1	–	1	1	1	1	–	–	3	43	6	14	66
–	1	–	–	–	–	–	–	–	–	–	1	–	–	–	2	–	–	–	2	–	2	–	11	13
–	1	–	–	–	3	–	–	–	1	–	–	–	–	–	–	–	–	–	1	–	15	1	8	24
–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	5	5
–	–	–	–	–	1	–	–	–	–	2	4	–	–	–	–	–	–	–	–	–	4	2	8	14
–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	4	4
–	–	–	–	–	–	–	2	–	–	–	–	1	2	–	1	–	46	–	6	1	50	–	12	63
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	8	–	–	–	9	9
–	12	1	1	–	24	–	9	1	38	2	42	4	48	2	19	3	107	1	28	18	459	14	248	739
–	4	–	2	–	1	–	11	–	–	1	57	–	–	2	30	–	1	–	44	–	8	5	262	275
–	16	1	3	–	25	–	20	1	38	3	99	4	48	4	49	3	108	1	72	18	467	19	510	1,014
–	–	1	–	–	24	–	12	–	30	1	33	2	47	4	49	2	64	1	58	14	368	16	352	750
–	9	–	3	–	–	–	1	–	1	–	25	1	–	–	–	–	–	–	–	1	22	1	82	106
–	7	–	–	–	1	–	3	–	–	–	–	–	1	–	–	–	–	–	–	–	13	–	7	20
–	–	–	–	–	–	–	4	1	7	2	41	1	–	–	–	1	44	–	14	3	64	2	69	138

DEATHS BY NATIVITY

NATIVITY:	Banes Division	Chiriqui Land Co.	Colombia Division	Cia. Bananera Costa Rica	Guatemala Division	Jamaica Division	Panama Division	Preston Division	Tela Railroad	Truxillo Railroad	Total
Austria	–	–	–	–	–	–	–	–	1	–	1
Barbados	–	–	–	2	–	–	–	–	–	–	2
British Honduras	–	–	–	–	2	–	–	–	3	1	6
British West Indies (other than Jamaica and Barbados)	–	1	–	4	–	–	2	2	–	1	10
Canada	1	–	–	1	–	–	–	–	–	–	2
Canary Islands	–	–	–	1	–	–	–	–	–	–	1
China	–	–	–	2	–	–	1	2	–	–	5
Colombia	–	–	84	2	–	–	1	1	–	–	88
Costa Rica	–	15	–	63	–	–	6	–	–	–	84
Cuba	74	–	–	–	–	–	–	85	–	–	159
Dutch West Indies	–	–	–	1	–	–	–	–	–	–	1
England	–	–	–	–	–	–	–	1	–	–	1
French West Indies	–	1	–	2	–	–	2	–	–	–	5
Germany	–	–	1	–	–	–	–	–	–	–	1
Guatemala	–	–	–	–	60	–	–	–	2	1	63
Haiti	13	–	–	–	–	–	–	22	1	–	36
Honduras	–	1	–	1	6	–	–	–	65	128	201
India	–	–	–	–	1	2	–	–	–	–	3
Jamaica	13	5	–	72	1	17	19	24	8	4	163
Mexico	–	–	–	–	1	–	–	–	2	–	3
Nicaragua	–	16	–	8	2	–	2	–	1	5	34
Norway	–	–	–	–	–	–	–	–	–	2	2
Palestine	–	–	–	–	–	–	–	–	2	–	2
Panama	–	25	–	2	–	–	10	–	–	–	37
Poland	–	–	–	–	–	–	–	–	–	1	1
Porto Rico	–	–	–	–	1	–	–	1	–	–	2
Salvador	–	2	–	1	8	–	–	–	13	5	29
Scotland	–	–	–	–	1	–	–	–	–	–	1
Spain	4	1	1	1	1	–	–	3	1	–	12
Sweden	–	–	–	–	1	–	–	–	–	–	1
United States	–	1	1	1	5	1	1	–	4	1	15
Venezuela	–	–	1	–	–	–	–	–	–	–	1
Unknown or unstated	–	3	–	1	–	–	1	–	2	35	42
Totals	105	71	88	165	90	20	45	141	105	184	1,014

CLASSIFICATION OF

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.
EPIDEMIC, ENDEMIC OR INFECTIOUS DISEASES:																				
Typhoid fever (abdominal typhoid and paratyphoid):																				
Typhoid fever	–	4	–	1	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–
Paratyphoid fevers	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	–
Malarial fever or cachexia:																				
Estivo-autumnal	1	3	–	3	–	4	1	2	–	–	–	–	–	1	–	8	–	–	–	4
Tertian	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3
Mixed	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Clinical	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cachexia	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1	–	–	–	–
Hemoglobinuric fever	–	–	–	–	–	6	–	–	–	1	–	–	–	7	1	2	–	2	–	–
Diphtheria	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Influenza (complications):																				
Pneumonia	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–
Dysentery:																				
Amebic	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Bacillary	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–
Unspecified or due to other causes	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Erysipelas	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Epidemic cerebro-spinal meningitis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Purulent or septicemic infections	–	–	–	–	–	–	–	–	–	2	–	–	–	1	–	2	–	3	–	1
Tetanus	–	–	–	1	–	1	–	1	–	–	–	–	–	1	–	2	–	–	–	–
Tuberculosis of the respiratory system:																				
Acute pulmonary tuberculosis	–	3	–	1	–	–	–	–	–	6	–	2	–	2	–	2	–	4	–	2
Other forms of tuberculosis of respiratory organs	–	–	–	–	–	3	–	2	–	–	–	–	–	–	–	–	–	–	–	–
Tuberculosis of the meninges or of the central nervous system	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tuberculosis of the intestines or peritoneum	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–
Disseminated tuberculosis:																				
Acute (including miliary tuberculosis of the lungs, except that specified as chronic or pulmonary)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	1
Chronic	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–
Syphilis (includes syphilitic infection of any organ, tissue or structure of the body):																				
Tertiary	–	1	–	–	–	–	–	1	–	–	–	–	–	1	–	2	–	–	–	–
Hereditary	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Period not specified	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–
GENERAL DISEASES NOT INCLUDED ABOVE:																				
Cancer or other malignant tumors of the buccal cavity:																				
Cancer of the mouth	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cancer of the jaw	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1
Others	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cancer or other malignant tumors of the stomach and liver:																				
Cancer of the stomach	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–
Cancer of the liver and gall bladder	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–
Cancer or other malignant tumors of the peritoneum, intestines and rectum:																				
Cancer of the intestines (except rectum)	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Cancer of the rectum and anus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Cancer or other malignant tumors of the female genital organs:																				
Cancer of the uterus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–

DEATHS BY DISEASE

Jamaica Division				Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-totals					Deaths in Hospitals			
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.			Emp.		Non-Emp.	
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total	T.	O.	T.	O.
–	2	–	1	–	–	–	–	–	–	–	4	–	–	–	1	–	–	–	–	–	7	–	8	15	–	5	–	7
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	2	–	1	1	–
–	–	–	–	–	1	–	3	–	–	–	1	–	1	–	1	–	–	–	8	1	10	1	30	42	1	9	1	28
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	3	–	–	–	3
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–	3	4	–	1	–	3
–	5	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5	–	2	7	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1	–	2	3	–	1	–	–
–	–	–	–	–	–	–	1	–	–	–	1	–	3	–	–	2	17	–	–	2	36	1	4	43	2	36	1	4
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	2	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	–	1	2	–	1	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	2	–	1	1	–
–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	2	–	2	–	2	4	–	2	–	2
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–
–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	2	–	5	–	2	–	13	–	7	20	–	13	–	7
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	2	–	6	8	–	2	–	6
–	2	–	–	–	–	–	1	–	6	–	6	–	5	1	2	–	7	–	–	–	35	1	16	52	–	29	1	9
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	4	–	2	6	–	3	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	1	–	2	–	1	1	–
–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	1	4	–	3	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	2	–	1	–	1
–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	4	–	4	8	–	3	–	4
–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	1	–	–	–	3	3	–	–	–	3
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	1
	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	–
	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	2	–	–	–	2
	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	1	–	–	–
	–	–	–	–	–	–	–	–	2	–	–	–	1	–	–	–	–	–	–	–	3	–	1	4	–	3	–	1
	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	2	1	–	3	–	2	1	–
	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	1
	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	2	2	–	–	–	2

CLASSIFICATION OF DEATHS

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.
GENERAL DISEASES NOT INCLUDED ABOVE—Concluded																				
Cancer or other malignant tumors of the skin	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cancer or other malignant tumors of other or unspecified organs:																				
Cancer of the pancreas	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
Cancer of the kidneys and suprarenals	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cancer of the prostate	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–
Cancer of the bladder	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Cancer of the bones (except jaw)	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Others	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Benign tumors and tumors not returned as malignant (except benign or non-specified tumors of the ovary and uterus):																				
Tumors of other location	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Beriberi	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Rickets	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Diabetes	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Anemia, chlorosis:																				
Pernicious anemia	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	1	–
Other anemias and chlorosis	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Alcoholism (acute or chronic)	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–
Other general diseases:																				
Purpura hemorrhagica	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Others	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE:																				
Encephalitis	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–
Meningitis:																				
Simple	–	–	–	1	–	–	–	–	–	1	–	1	–	–	–	–	–	1	–	2
Non-epidemic cerebrospinal meningitis	–	–	–	–	–	3	–	–	–	–	–	2	–	–	–	–	–	–	–	–
Other diseases of the spinal cord:																				
Myelitis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cerebral hemorrhage, apoplexy:																				
Cerebral hemorrhage	–	–	–	1	–	–	–	–	1	1	–	–	–	1	–	2	–	–	–	–
Cerebral thrombosis and embolism	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Paralysis (without specified cause):																				
Hemiplegia	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–	3	–	–	–	–
General paralysis (of the insane)	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Convulsions (non-puerperal) (5 years and over)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–
Infantile convulsions (under 5 years of age)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other diseases of the nervous system	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Diseases of the organs of hearing and the mastoid process:																				
Diseases of the mastoid process	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
DISEASES OF THE CIRCULATORY SYSTEM:																				
Acute endocarditis and myocarditis:																				
Acute endocarditis	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Acute myocarditis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	1
Angina pectoris	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Other diseases of the heart:																				
Chronic endocarditis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–
Chronic myocarditis	–	1	–	–	–	1	–	–	–	4	–	1	–	5	–	9	–	–	–	–
Other chronic diseases of the heart	1	5	–	2	–	2	–	–	–	2	–	5	–	3	–	3	–	–	–	–
Aneurism	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1

BY DISEASE—*Continued*

Jamaica Division				Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-totals					Deaths in Hospitals			
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.			Emp.		Non-Emp.	
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total	T.	O.	T.	O.
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	1
–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	2	–	–	2	–	2	–	–
–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	1	2	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	2	–	1	1	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	2	–	1	–	1
–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	–	–	1	–	2	3	–	1	–	2
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	1	3	4	–	–	1	2
–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–	2	–	1	3	–	2	–	1
–	–	–	–	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	–	1	1	–	1	3	1	–	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	1	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	–	1	–	–	1	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	2	–	1	–	–	–	–	–	–	–	–	–	1	–	1	–	5	–	6	11	–	5	–	5
–	–	–	–	–	1	–	–	–	–	–	–	–	1	–	1	–	–	–	1	–	5	–	4	9	–	5	–	2
–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	1	–	1	–	1	–	–	–	–	–	–	–	–	–	–	1	4	–	4	9	1	4	–	3
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	1	2	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1	–	5	6	–	1	–	4
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	3	3	–	–	–	3
–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	2	–	–	–	–	–	–	1	3	4	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	–	1	2	–	1	–	–
–	–	–	–	–	1	–	–	–	–	–	3	–	–	–	–	–	2	–	–	–	4	–	3	7	–	4	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	2	–	4	–	3	–	7	10	–	3	–	7
–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	2	–	1	–	–
–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	2	–	1	–	3	4	–	1	–	3
–	–	–	–	–	1	–	–	–	4	–	2	1	1	–	2	–	1	–	2	1	18	–	16	35	1	17	–	14
–	–	–	–	–	3	–	–	–	3	–	2	–	1	–	1	–	1	–	–	1	20	–	13	34	1	13	–	11
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	2	–	–	–	2

CLASSIFICATION OF DEATHS

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.
DISEASES OF THE CIRCULATORY SYSTEM—Concluded																				
Atheroma and other diseases of the arteries	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–
DISEASES OF THE RESPIRATORY SYSTEM:																				
Bronchitis:																				
Acute	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Not otherwise defined under 5 years of age	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Bronchopneumonia (including capillary bronchitis):																				
Bronchopneumonia	–	3	–	14	–	3	–	2	–	3	–	2	–	4	–	9	–	–	–	1
Capillary bronchitis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Pneumonia:																				
Lobar	1	3	–	2	–	8	–	3	–	8	–	7	–	5	–	4	–	10	–	4
Not otherwise specified	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–	5	–	–	–	–
Pleurisy	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other diseases of the respiratory system (tuberculosis excepted):																				
Others	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	1	–	–	–	–
DISEASES OF THE DIGESTIVE SYSTEM:																				
Diseases of the pharynx and tonsils (including adenoids):																				
Others	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–
Diseases of the esophagus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Ulcer of the stomach and duodenum:																				
Ulcer of the stomach	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Ulcer of the duodenum	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other diseases of the stomach (cancer excepted):																				
Indigestion	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
Others	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–
Diarrhea and enteritis (under 2 years of age)	–	–	–	12	–	–	–	2	–	–	–	2	–	–	–	6	–	–	–	–
Diarrhea and enteritis (2 years and over)	–	–	–	1	–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	–
Ankylostomiasis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Appendicitis and typhlitis	–	–	–	1	–	1	–	–	–	–	–	–	–	1	–	–	–	–	1	–
Hernia, intestinal obstruction:																				
Hernia	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–
Intestinal obstruction	–	–	–	1	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Other diseases of the intestines:																				
Others	–	–	–	–	–	1	–	1	–	1	–	–	–	2	–	–	–	–	–	–
Acute yellow atrophy of the liver	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–
Cirrhosis of the liver:																				
Returned as alcoholic	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–
Not returned as alcoholic	–	–	–	–	–	–	–	1	–	4	–	–	–	–	–	–	–	1	–	–
Other diseases of the liver:																				
Abscess of the liver, amebic	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–
Other diseases of the liver	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
Diseases of the pancreas (except cancer)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Peritonitis of unstated cause	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–	–	1	–	–
NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ITS ADNEXA:																				
Acute nephritis (including unspecified under 10 years of age)	–	–	–	–	–	–	–	–	1	2	–	2	–	–	–	2	–	–	–	–
Chronic nephritis (including unspecified over 10 years of age)	–	2	–	2	–	1	–	1	–	2	–	–	–	3	–	1	1	1	–	2

3Y DISEASE—*Continued*

Jamaica Division				Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-totals					Deaths in Hospitals			
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.			Emp.		Non-Emp.	
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total	T.	O.	T.	O.
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	2	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	3	3	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	2	2	–	–	–	–
–	–	–	–	–	3	–	1	–	–	–	14	–	–	–	6	–	1	–	3	–	17	–	52	69	–	16	–	27
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–
–	–	–	–	–	3	–	2	–	1	–	3	–	3	–	5	–	11	–	5	1	52	–	35	88	1	51	–	31
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	6	7	–	1	–	3
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	2	3	–	1	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	1	–	–	–	1
–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	–
–	–	1	–	–	–	–	–	–	2	–	1	–	–	–	–	–	–	–	–	–	2	1	1	4	–	2	1	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	16	–	–	–	–	–	–	–	1	–	–	–	39	39	–	–	–	9
–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	–	3	4	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	2	2	3	7	–	1	2	2
–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	2	–	–	2	–	2	–	–
–	1	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	–	–	–	–	3	1	–	4	–	2	1	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	–	1	5	–	4	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	–	1	2	–	1	–	1
–	1	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	2	–	–	–	10	–	1	11	–	9	–	1
–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	1	–	–	–	–	–	2	–	2	4	–	2	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	2	–	–	2	–	2	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	2	–	2	4	–	2	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	2	–	–	–	–	1	3	–	6	10	1	3	–	4
–	3	–	–	–	4	–	–	–	6	–	1	–	2	1	1	–	1	–	1	1	25	1	9	36	1	18	1	6

CLASSIFICATION OF DEATHS

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.
NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ITS ADNEXA—Concluded																				
Other diseases of the kidneys and their adnexa (diseases of the kidney in pregnancy not included)	–	–	–	–	–	–	–	–	–	–	–	2	–	2	–	2	–	1	–	–
Diseases of the bladder (except tumors)	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Diseases of the urethra, urinary abscess, etc.:																				
Others	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–
Non-venereal diseases of the male genital organs	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cysts and other benign tumors of the ovary	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Salpingitis or pelvic abscess	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
THE PUERPERAL STATE:																				
Accidents of pregnancy:																				
Abortion	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Other accidents of pregnancy	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Puerperal hemorrhage	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Other accidents of childbirth:																				
Cesarian section	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Puerperal septicemia	–	–	1	1	–	–	–	–	–	–	–	1	–	–	–	2	–	–	–	1
Puerperal albuminuria or convulsions	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Childbirth (without other explanation)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE:																				
Gangrene	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
Boil, carbuncle, furuncle	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Phlegmon, acute abscess	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other diseases of the skin and its adnexa:																				
Ulcer of the skin	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
DISEASES OF THE BONES AND OF THE ORGANS OF LOCOMOTION:																				
Diseases of the joints (tuberculosis and rheumatism excepted)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
DISEASES OF EARLY INFANCY:																				
Congenital debility, icterus and sclerema:																				
Marasmus	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1
Inanition	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Others	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Premature birth, or consequence of labor:																				
Premature birth	–	–	–	2	–	–	–	2	–	–	–	–	–	–	–	1	–	–	–	–
Injury at birth	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–
Other diseases peculiar to early infancy:																				
Umbilical infection	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Lack of care	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
OLD AGE:																				
Old age (senility)	–	–	–	1	–	–	–	–	–	–	–	–	–	3	–	1	–	–	–	–
EXTERNAL CAUSES:																				
Suicide (burns)	–	–	–	8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Suicide (firearms)	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Suicide (poisoning)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

BY DISEASE—*Continued*

Jamaica Division				Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-totals					Deaths in Hospitals			
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.			Emp.		Non-Emp.	
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total	T.	O.	T.	O.
–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	–	–	–	–	–	–	3	–	6	9	–	2	–	5
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1	–	1	2	–	1	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	–	–	–	–	2	2	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	2	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	1	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	2	2	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	1	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	4	–	–	–	2	–	–	–	2	–	–	1	13	14	–	–	–	13
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	2	2	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	2	2	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	2	–	1	–	1
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	3	–	–	–	8	8	–	–	–	7
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	2	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	8	–	–	–	–	–	–	–	–	–	–	–	10	10	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	1	–	–	–	8	8	–	–	–	6
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	5	5	–	–	–	5
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	1	–	–	–	4	4	–	–	–	1
–	–	–	–	–	–	–	–	–	–	1	2	–	–	–	–	–	–	–	–	–	3	1	4	8	–	3	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8	8	–	–	–	8
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	1

CLASSIFICATION OF DEATHS

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O
EXTERNAL CAUSES—Concluded																				
Other acute poisonings	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Burns and scalds	–	–	–	–	–	1	–	–	–	–	–	–	1	–	–	–	–	–	–	
Accidental drowning	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	
Injury by firearms	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	2	–	–	–	
Injury by cutting or piercing instruments	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	1	–	
Injury by falls	–	1	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	
Traumatism by other crushing (vehicles, railways, landslides, etc.)	–	1	–	1	–	5	–	–	–	1	–	2	–	2	–	2	–	1	–	
Homicide by firearms	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	
Homicide by cutting or piercing instruments	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	4	–	
Homicide by other means	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	
Fractures (cause not specified)	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	
Other external violence	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	2	–	–	–	
ILL-DEFINED DISEASES:																				
Ill-defined organic diseases	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	
Sudden death	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	
Infections of undetermined origin	–	–	–	–	–	2	–	–	–	1	–	1	–	–	–	–	–	–	–	
Unstated	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	
TOTALS	4	31	1	69	1	47	1	22	2	49	1	36	2	65	1	97	1	40	6	

NOTE.—This table includes *all* deaths. See appendix of table, on pages 214–215.

Y DISEASE—*Concluded*

Jamaica Division				Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-totals					Deaths in Hospitals			
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.			Emp.		Non-Emp.	
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total	T.	O.	T.	O.
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	1	–	–	–	1
–	–	–	–	–	–	–	1	–	–	–	2	–	2	–	–	–	–	1	–	1	3	1	3	8	1	3	1	3
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	2	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	1	1	7	–	4	–	3	–	3	1	11	–	10	22	–	11	–	9
–	–	–	–	–	1	–	–	–	1	–	–	–	1	–	–	–	5	–	–	1	9	–	2	12	1	6	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	4	–	–	4	–	4	–	–
–	–	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	2	–	1	–	13	–	10	23	–	5	–	8
–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	16	–	1	–	17	–	4	21	–	1	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	17	–	–	1	22	–	2	25	–	4	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	–	1	3	–	1	5	1	3	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	2	4	–	1	–	2
–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	4	5	–	1	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	2	–	–	–	–
–	–	–	–	–	–	–	1	–	–	–	–	–	3	–	–	–	–	–	3	–	6	–	5	11	–	5	–	5
–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	6	–	13	–	6	–	15	21	–	–	–	–
–	16	1	3	–	25	–	20	1	38	3	99	4	48	4	49	3	108	1	72	18	467	19	510	1,014	14	368	16	352

RECORD OF

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O
EPIDEMIC, ENDEMIC OR INFECTIOUS DISEASES:																				
Tuberculosis of the respiratory system:																				
Acute pulmonary tuberculosis	–	–	–	–	–	–	–	–	1	26	–	–	–	2	–	–	–	–	–	
Other forms of tuberculosis of respiratory organs	–	–	–	–	–	9	–	–	–	–	–	–	–	–	–	–	–	–	–	
Syphilis (including syphilitic infection of any organ, tissue or structure of the body):																				
Tertiary	–	1	–	–	–	1	–	–	–	1	–	–	–	1	–	–	–	–	–	
Gonococcal infection except that of the eye or adnexa	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	
GENERAL DISEASES NOT INCLUDED ABOVE:																				
Cancer or other malignant tumors of the buccal cavity:																				
Cancer of the tongue	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Cancer or other malignant tumors of other or unspecified organs:																				
Cancer of the prostate	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	
Disease of the spleen	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	
DISEASES OF THE NERVOUS SYSTEM AND ORGANS OF SPECIAL SENSE:																				
Progressive locomotor ataxia (tabes dorsalis)	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	
Paralysis (without specified cause):																				
Hemiplegia	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	
Other forms of mental alienation	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
DISEASES OF THE CIRCULATORY SYSTEM:																				
Other diseases of the heart:																				
Chronic myocarditis	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	
Other chronic diseases of the heart	–	1	–	–	–	–	–	–	–	4	–	–	–	–	–	–	–	–	–	
Aneurism	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Atheroma and other diseases of the arteries	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	
DISEASES OF THE DIGESTIVE SYSTEM:																				
Hernia, intestinal obstruction:																				
Hernia	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Cirrhosis of the liver:																				
Not returned as alcoholic	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	
NON-VENEREAL DISEASES OF THE GENITOURINARY SYSTEM AND ITS ADNEXA:																				
Chronic nephritis (including unspecified over 10 years of age)	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	
DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE:																				
Other diseases of the skin and its adnexa:																				
Ulcer of the skin	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	
Other diseases of the skin and its adnexa	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	

REPATRIATIONS

Jamaica Division				Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-Totals				
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total
–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	1	31	–	–	32
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	9	–	–	9
–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5	–	–	5
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1
–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1
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RECORD OF REPA

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O
DISEASES OF THE BONES AND OF THE ORGANS OF LOCOMOTION:																				
Diseases of the bones (tuberculosis excepted)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
OLD AGE:																				
Old age (senility)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
TOTALS	–	3	–	–	–	12	–	–	1	39	–	–	–	4	–	–	–	–	–	

TRIATIONS—*Concluded*

Jamaica Division				Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-Totals				
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total
-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
-	-	-	-	-	6	-	1	-	-	-	-	-	4	-	-	-	-	-	-	1	68	-	1	70

CLASSIFICATION OF DISEASES

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.
Epidemic, Endemic or Infectious Diseases:																				
Typhoid fever (abdominal typhoid and paratyphoid):																				
Typhoid fever	–	20	1	38	–	–	–	–	1	2	1	5	–	1	–	3	–	–	–	–
Paratyphoid fevers	–	–	–	–	–	–	–	–	1	3	1	1	–	1	–	3	–	1	–	–
Typhus fever (exanthematous)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Relapsing fever (spirillum obermeieri)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Melitococcosis (Malta fever)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Malarial fever or cachexia:																				
Estivo-autumnal	12	64	–	22	27	199	7	43	16	482	1	23	15	315	6	180	7	318	14	192
Tertian	–	3	–	–	78	158	2	46	20	122	–	10	–	1	–	1	2	135	6	95
Quartan	–	–	–	1	1	–	–	–	–	14	–	–	–	–	–	1	–	7	–	12
Mixed	–	1	–	–	–	1	–	1	1	4	–	1	–	–	–	–	3	87	2	63
††Clinical	–	3	–	1	12	50	–	5	2	92	–	13	–	5	–	1	1	3	1	2
Cachexia	–	3	–	–	–	4	–	–	–	–	–	–	–	3	–	–	–	–	–	
Hemoglobinuric fever	–	–	–	1	–	23	–	4	–	2	–	1	–	16	1	8	–	12	1	2
Smallpox	–	–	–	–	–	–	–	–	–	4	–	–	–	–	–	–	–	–	–	–
Measles	–	–	–	–	–	–	–	–	–	1	–	–	–	9	–	5	–	2	–	1
Scarlet fever	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Whooping cough	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Diphtheria	–	1	–	9	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	–
Influenza (complications):																				
Pneumonia	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	1	7	2	4
Bronchitis	3	16	–	4	–	2	1	1	3	98	1	3	–	–	–	–	–	–	–	–
Heart disease	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Nephritis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Meningitis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Gastro-intestinal	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Puerperal	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Others	–	–	–	–	–	–	–	–	–	–	–	–	7	75	2	21	–	–	–	–
Miliary fever	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mumps	–	–	–	–	–	5	–	–	–	1	–	–	–	–	–	–	–	–	–	1
Asiatic cholera	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cholera nostras (choleriform enteritis)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Dysentery:																				
Amebic	–	3	–	1	–	27	–	6	1	35	–	4	1	17	–	11	–	24	3	2
Bacillary	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–
Unspecified or due to other causes	–	–	–	–	–	7	–	1	–	7	1	1	–	1	1	–	–	2	–	–
Amebiasis without dysentery	–	–	–	1	1	2	–	–	3	41	–	11	–	3	–	1	–	–	–	–
Plague:																				
Bubonic	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Pneumonic	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Septicemic	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Unspecified	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Yellow fever	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Ictero-hemorrhagica spirochetosis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Leprosy	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	2	–	–	–	
Erysipelas	–	–	–	1	–	–	–	3	2	7	–	–	1	1	–	5	–	4	1	
Acute poliomyelitis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Encephalitis lethargica	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Epidemic cerebrospinal meningitis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Other epidemic diseases:																				
Alastrim or Kaffir milk-pox	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Varicella	–	–	–	–	–	–	–	–	–	26	–	1	–	2	–	1	–	–	–	
Filariasis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	
Dengue	–	–	–	–	–	–	–	–	–	1	1	2	–	–	–	–	–	–	–	
Yaws	–	3	–	–	–	1	–	–	–	3	–	1	–	–	–	–	–	–	–	
Others	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Purulent or septicemic infection	–	–	–	–	–	–	–	–	–	3	–	–	–	1	–	2	–	3	–	

TREATED IN HOSPITALS

Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-totals*					Deaths in Hospitals*			
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.			Emp.		Non-Emp.	
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total*	T.	O.	T.	O.
–	–	–	–	–	13	1	16	–	8	–	11	–	–	–	–	1	44	3	73	121	–	5	–	7
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	5	1	4	11	–	1	1	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
4	71	1	35	11	68	2	27	15	506	9	122	34	788	2	233	144*	2813*	43*	877	3877*	1	9	1	28
1	2	–	–	1	2	–	3	8	104	3	25	8	83	2	21	120*	613*	13	201	947*	–	–	–	3
–	–	–	1	–	–	–	–	1	21	–	2	–	5	1	5	2	47	1	22	72	–	–	–	–
–	–	–	–	–	–	–	–	1	11	–	6	9	45	1	11	14	150*	3	82	249*	–	1	–	3
1	4	–	1	1	1	–	–	–	41	1	4	1	3	–	2	26*	205*	2	29	262*	–	–	–	–
–	4	–	2	–	–	–	–	–	7	–	1	–	1	–	–	–	22	–	3	25	–	1	–	–
–	9	–	4	–	1	–	1	–	9	–	–	2	45	–	3	2	117	2	24	145	2	36	1	4
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	–	–	4	–	–	–	–
–	–	–	–	–	–	–	–	1	39	–	10	–	16	1	14	1	67	1	30	99	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	2	–	–	–	3	3	–	–	–	–
–	–	–	–	–	–	–	4	–	–	–	–	–	–	–	–	–	2	1	13	16	–	–	–	2
–	–	–	–	–	–	–	–	1	137	–	6	–	–	–	–	2	146	2	10	160	–	1	–	–
–	1	–	1	–	–	–	–	–	1	–	–	–	–	–	2	8*	120*	2	11	141*	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
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–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	13	–	1	3	5	1	–	1	63	1	5	–	7	–	25	11	165*	4	52	232*	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	1	7	–	1	9	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	4	–	1	1	3	–	–	1	34	5	37	1	13	–	11	5	160	8	94	267	–	1	–	1
–	–	–	–	–	–	–	–	1	5	–	2	–	–	–	–	1	6	1	2	10	–	1	1	–
–	–	–	–	–	3	–	1	–	30	–	1	2	9	–	4	2	59	2	8	71	–	2	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	46	–	13	63	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
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–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	2	3	–	–	–	–
–	1	–	1	1	2	–	1	2	4	1	4	1	2	–	1	7	21	2	23	53	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	1	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	1	2	–	3	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	1	–	2	–	–	–	14	–	1	–	1	–	–	–	45	–	4	49	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	2	4	–	–	–	–
–	–	–	–	–	37	–	–	–	–	–	–	–	–	–	–	–	44	–	1	45	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	2	2	–	–	–	–
–	–	–	–	–	–	–	–	–	2	–	3	–	8	1	4	–	17	1	10	28	–	13	–	7

CLASSIFICATION OF DISEASES

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.
Epidemic, Endemic or Infectious Diseases—*Concluded*																				
Glanders and farcy	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Malignant pustule (anthrax)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Rabies	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tetanus	–	1	–	2	–	1	–	1	–	1	–	–	–	1	–	5	–	–	–	–
Mycoses	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tuberculosis of the respiratory system:																				
Acute pulmonary tuberculosis	1	11	1	7	–	–	–	–	1	41	1	5	–	22	1	22	–	20	2	16
Other forms of tuberculosis of the respiratory organs	–	–	–	–	–	18	–	5	–	–	–	–	–	–	–	–	–	–	–	–
Tuberculosis of the meninges or of the central nervous system	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tuberculosis of the intestines or peritoneum	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–
Tuberculosis of the vertebral column	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–
Tuberculosis of the joints	–	–	–	1	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–
Tuberculosis of other organs and structure:																				
Tuberculosis of the skin and subcutaneous cellular tissue	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tuberculosis of the bones (except vertebral column)	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tuberculosis of the lymphatic system (except the mesenteric and retroperitoneal glands)	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tuberculosis of the genitourinary system	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tuberculosis of other organs	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Disseminated tuberculosis:																				
Acute (including miliary tuberculosis of the lungs, except that specified as chronic or pulmonary)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	–	
Chronic	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	
Syphilis (includes syphilitic infection of any organ, tissue or structure of the body):																				
Primary	–	1	–	1	–	1	–	–	–	3	3	–	–	10	1	2	–	12	–	
Secondary	–	5	–	–	–	–	–	–	–	27	–	1	–	7	3	2	–	4	–	
Tertiary	–	24	–	2	–	55	1	10	1	146	–	8	2	94	1	44	–	14	1	
Hereditary	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	3	–	2	–	
Period not specified	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	7	–	
Soft chancre	–	–	–	–	1	6	1	1	–	15	2	1	–	4	2	4	1	31	1	1
Gonococcal infection, except that of the eye or adnexa	3	23	–	9	4	18	–	–	2	92	7	14	5	45	19	31	7	38	6	3
Gonococcal ophthalmia	–	2	–	–	–	–	–	1	–	3	–	4	–	–	–	1	–	–	–	
General Diseases Not Included Above:																				
Cancer or other malignant tumors of the buccal cavity:																				
Cancer of the lip	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	
Cancer of the tongue	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	1	–	–	–	
Cancer of the mouth	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	
Cancer of the jaw	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	
Others	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Cancer or other malignant tumors of the stomach and liver:																				
Cancer of the pharynx	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Cancer of the esophagus	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	

TREATED IN HOSPITALS—*Continued*

Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-totals*					Deaths in Hospitals*			
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.			Emp.		Non-Emp.	
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total*	T.	O.	T.	O.
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	2	–	1	–	2	–	–	–	1	–	5	–	13	18	–	2	–	6
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	5	–	4	2	11	–	9	1	49	2	17	–	33	–	3	5	192	7	83	287	–	29	1	9
–	–	–	–	–	–	–	–	1	–	–	–	–	9	–	2	1	27	–	7	35	–	3	–	2
–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	–	2	3	–	1	–	–
–	–	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	1	1	1	3	–	1	1	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	2	3	–	–	–	–
–	–	–	–	–	1	–	2	–	–	–	–	–	–	–	–	–	1	–	4	5	–	–	–	–
–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	–	–	1	–	–	–	–
–	–	–	–	–	4	–	–	–	–	–	–	–	–	–	–	–	4	–	1	5	–	–	–	–
–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	–	–	1	1	1	3	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5	–	1	6	–			1
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–	2	3	–			1
–	–	–	–	–	5	–	–	–	10	–	1	–	–	–	–	–	42	4	9	55	–	–	–	–
–	1	–	1	–	6	–	1	–	22	–	12	–	3	–	2	–	75	3	20	98	–	–	–	–
–	12	–	2	1	29	–	8	4	38	5	44	–	10	–	8	8	422	8	130	568	–	3	–	4
–	–	–	–	–	–	–	2	–	–	–	–	–	1	–	1	–	5	–	7	12	–	–	–	3
–	3	–	–	–	–	–	–	–	2	–	–	–	8	–	–	–	21	–	3	24	–	–	–	1
–	–	–	–	–	5	–	–	–	35	–	6	–	15	1	3	2	111	7	27	147	–	–	–	–
–	9	–	1	2	35	–	7	6	74	5	19	1	36	5	11	30	371*	42	124	567*	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	5	–	7	12	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	1	3	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	2	2	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	2	3	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	1	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	2	2	–	–	–	–

CLASSIFICATION OF DISEASES

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.
General Diseases Not Included Above—*Continued*																				
Cancer of the stomach	–	–	–	–	–	–	–	–	–	2	–	1	–	1	–	–	–	–	–	–
Cancer of the liver and gall bladder	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	1	–
Cancer or other malignant tumors of the peritoneum, intestines and rectum:																				
Cancer of the mesentery and peritoneum	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–
Cancer of the intestines (except rectum)	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	–	–	–
Cancer of the rectum and anus	–	1	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1
Others	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cancer or other malignant tumors of the female genital organs:																				
Cancer of the ovary and fallopian tubes	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cancer of the uterus	–	–	–	–	–	–	–	–	–	–	–	6	–	–	–	5	–	–	–	–
Cancer of the vagina and vulva	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Others	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cancer or other malignant tumors of the breast	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–
Cancer or other malignant tumors of the skin	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cancer or other malignant tumors of other or unspecified organs:																				
Cancer of the larynx	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–
Cancer of the lung and pleura	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cancer of the pancreas	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1
Cancer of the kidneys and suprarenals	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cancer of the prostate	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	–	1	–
Cancer of the bladder	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Cancer of the brain	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cancer of the bones (except jaw)	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Cancer of the testes	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	–	–	–	–
Others	–	–	–	1	–	1	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Benign tumors and tumors not returned as malignant (except benign or non-specified tumors of the ovary and uterus):																				
Tumor of brain	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–
Tumor of thorax	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tumor of abdomen	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–	–	–	–	–
Tumor of bladder	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tumor of prostate	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tumor of other location	1	4	2	4	–	–	–	–	2	10	–	10	–	2	–	–	–	1	–	–
Acute febrile articular rheumatism	1	2	–	2	–	1	–	–	–	33	–	1	–	3	–	1	1	5	1	5
Chronic rheumatism or gout:																				
Chronic rheumatism	2	9	–	1	–	–	–	–	–	12	–	1	–	4	–	4	3	18	6	7
Chronic gout	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Scurvy	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Pellagra	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Beriberi	–	1	–	–	–	–	–	–	–	13	–	2	–	–	–	–	–	–	–	–
Rickets	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Diabetes	–	2	–	2	–	–	–	–	–	1	–	2	–	4	–	1	–	–	1	–
Anemia, chlorosis:																				
Pernicious anemia	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	2	19	2	13
Other anemias and chlorosis	1	4	–	7	–	2	–	1	–	10	–	1	–	22	1	22	–	11	–	4
Diseases of the pituitary gland	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Diseases of the thyroid gland:																				
Exophthalmic goiter	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

TREATED IN HOSPITALS—*Continued*

Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-totals*					Deaths in Hospitals*			
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.			Emp.		Non-Emp.	
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total*	T.	O.	T.	O.
–	–	–	–	–	3	–	–	–	1	–	1	–	–	–	–	–	7	–	2	9	–	3	–	1
–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1	–	2	1	3	6	–	2	1	–
–	–	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	2	–	1	3	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	1	1	3	–	1	–	–
–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	2	–	2	4	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	2	–	–	–	1	–	–	–	2	–	–	–	16	16	–	–	–	2
–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	–	–	–	–	2	2	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	2	3	–	–	–	–
–	–	–	–	–	–	–	1	1	1	–	–	–	–	–	–	1	1	–	1	3	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	2	–	1	3	–	2	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	1	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	1	–	3	–	1	1	–
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–	1	2	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	1	–	–	1	–	–	–	–	1	–	1	1	2	4	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	2	–	–	–	–
–	2	–	–	–	–	–	2	–	–	–	3	–	–	–	–	–	4	–	6	10	–	1	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	–
–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–	–	2	–	2	4	–	–	–	–
–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	1	1	6	1	–	1	6	–	5	–	2	–	2	5	31	3	22	61	–	1	–	–
–	–	–	–	–	–	–	–	–	–	1	1	–	11	–	2	4*	55	3*	12	74*	–	–	–	–
–	3	–	–	1	10	–	1	–	1	–	–	–	3	–	2	6	60	6	16	88	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	3	–	–	–	4	–	–	–	11	–	–	–	32	–	2	34	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	1	–	–	–	2	–	1	–	–	–	3	–	–	–	–	–	10	1	9	20	–	1	–	2
–	–	–	–	–	3	1	–	–	–	1	–	–	–	–	2	2	22	4	17	45	–	–	1	2
–	1	–	–	–	–	–	–	–	9	–	14	3	22	1	1	4	81	2	50	137	–	2	–	1
–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	2	–	–	2	–	–	–	–
–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	4	4	–	–	–	–

CLASSIFICATION OF DISEASES

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.
General Diseases Not Included Above—*Concluded*																				
Other diseases of the thyroid gland	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	1
Diseases of the parathyroid glands	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Diseases of the thymus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Addison's disease (disease of the adrenals)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
††Disease of the spleen	–	–	–	–	–	–	–	–	3	70	–	–	–	7	–	2	–	–	–	1
Leukemia and Hodgkin's disease:																				
Leukemia	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Hodgkin's disease	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–
Alcoholism (acute or chronic)	–	–	–	–	–	–	1	–	–	1	–	–	2	1	2	–	–	6	–	1
Chronic poisoning by mineral substances	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Chronic poisoning by organic substances	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–
Other general diseases:																				
Acidosis	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–
Amyloid degenerations	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Autointoxications	–	–	–	–	–	–	–	–	1	4	–	4	–	–	–	–	–	–	–	–
Hemophilia	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Purpura hemorrhagica	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Others	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Diseases of the Nervous System and of the Organs of Special Sense:																				
Encephalitis	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–
Meningitis:																				
Simple	–	–	–	1	–	–	–	–	–	1	–	1	–	–	–	–	–	1	–	2
Non-epidemic cerebrospinal meningitis	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Progressive locomotor ataxia (tabes dorsalis)	–	1	–	–	–	–	–	–	–	3	–	1	–	1	–	–	–	–	–	–
Other diseases of the spinal cord:																				
Bulbar paralysis (Duchenne's disease)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Paralysis agitans (Parkinson's disease)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Acute ascending spinal paralysis (Landry's disease)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Myelitis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Others	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cerebral hemorrhage, apoplexy:																				
Cerebral hemorrhage	–	–	–	–	–	–	–	–	1	1	–	–	–	1	–	2	–	–	–	1
Cerebral thrombosis and embolism	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Paralysis (without specified cause):																				
Hemiplegia	–	1	–	–	1	1	–	1	–	–	–	–	–	4	–	6	–	–	–	–
Other forms of paralysis	–	–	–	–	–	–	–	–	–	2	–	–	–	1	–	3	–	–	–	–
General paralysis (of the insane)	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	1	–	–	–	–
Other forms of mental alienation	–	1	–	3	–	–	–	–	–	1	–	–	–	1	–	2	–	–	–	–
Epilepsy	–	1	–	1	–	–	–	–	–	7	–	–	–	3	–	4	–	–	–	1
Convulsions (non-puerperal) (5 years and over)	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–
Infantile convulsions (under 5 years of age)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Chorea:																				
Chorea	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–	–	–	–	
Hysteria and neuralgia	–	3	–	10	–	1	–	1	–	9	–	2	–	5	–	5	–	–	–	–
Neuritis	3	4	–	3	2	–	–	–	–	25	–	2	–	6	–	2	–	–	1	–
Softening of the brain	–	–	–	–	–	–	–	–	–	–	–	–		–	–	–	–	–	–	–
Other diseases of the nervous system	–	1	–	1	1		–	–	–	5	–		–	1	–	3	–	1	–	–

TREATED IN HOSPITALS—*Continued*

Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-totals*					Deaths in Hospitals*			
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.			Emp.		Non-Emp.	
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total*	T.	O.	T.	O.
–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	1	2	4	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	2	179	–	8	5	256	–	11	272	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	1	–	2	–	–	–	–
1	–	–	2	–	–	–	–	5	1	–	2	1	1	3	3	9	10	6	8	33	1	–	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	2	3	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	2	–	–	1	3	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	1	–	–	2	–	–	–	–	–	–	–	–	2	4	–	6	12	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	1	–	3	–	–	–	3	–	1	4	–	–	–	1
–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	1	1	–	2	–	–	1	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	2	–	1	–	–	–	–	–	–	–	–	–	2	–	1	–	6	–	6	12	–	5	–	5
–	1	–	–	–	–	–	–	–	1	–	1	–	–	–	1	–	5	–	2	7	–	5	–	2
–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	6	–	1	7	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	2	–	–	2	–	1	–	–
–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–
–	1	–	1	–	1	–	–	–	–	1	–	–	–	–	2	1	4	1	6	12	1	4	–	3
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	1	–	–	–	1
–	1	–	2	–	1	–	1	–	–	–	–	–	–	–	1	1	8	–	11	20	–	1	–	4
–	1	–	–	–	–	–	1	–	1	–	–	–	1	–	1	–	6	–	5	11	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	1	3	–	1	–	–
–	2	–	1	–	3	–	1	–	1	–	3	–	–	–	2	–	9	–	12	21	–	–	–	–
–	–	–	–	–	1	–	–	–	5	–	–	–	2	–	2	–	19	–	8	27	–	–	–	–
–	–	–	–	–	–	–	–	–	8	–	3	–	–	–	–	–	8	–	5	13	–	–	–	3
–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	2	2	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	2	3	–	–	–	–
–	2	1	–	2	3	1	11	–	9	–	4	–	2	–	6	2	34	2	39	77	–	–	–	–
–	–	–	–	–	11	–	3	1	11	2	3	–	–	–	1	7*	57	3	14	81*	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1	–	–	1	3	9	3	7	–	6	1	14	1	4	1	5	6	27	5	31	69	–	1	–	–

CLASSIFICATION OF DISEASES

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.
Diseases of the Nervous System and of the Organs of Special Sense—*Concluded*																				
Diseases of the organs of vision and adnexa (except gonococcal infection):																				
Diseases of the eye (except tumor)	–	6	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1
Follicular conjunctivitis	–	–	–	–	–	5	–	–	1	37	–	2	–	5	–	1	3	54	1	16
Trachoma	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tumors of the eye	–	3	–	2	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–
Other diseases of the eye or its adnexa	–	9	–	–	–	3	–	2	1	27	–	2	–	11	–	3	–	5	–	1
Diseases of the organs of hearing and the mastoid process:																				
Diseases of the ear	–	–	–	1	–	–	–	–	3	20	–	4	–	8	–	–	1	16	–	7
Diseases of the mastoid process	–	–	–	1	–	–	–	–	–	1	–	–	–	–	–	1	–	1	–	1
Diseases of the Circulatory System:																				
Pericarditis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Acute endocarditis and myocarditis:																				
Acute endocarditis	–	1	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	5	1	4
Acute myocarditis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	4
Angina pectoris	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Other diseases of the heart:																				
Chronic endocarditis	–	–	–	–	–	1	–	–	1	–	–	–	–	–	–	3	–	–	–	–
Chronic myocarditis	–	4	–	1	–	1	–	–	2	9	–	4	–	10	–	20	–	1	1	–
Other chronic diseases of the heart	1	11	–	6	–	4	–	–	–	18	–	8	–	10	1	17	4	7	2	3
Aneurism	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	2	–	–	–	1
Atheroma and other diseases of the arteries	–	–	–	–	–	–	–	–	–	30	1	1	–	1	–	10	–	–	–	1
Embolism and thrombosis (except cerebral)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Diseases of the veins (varices, hemorrhoids, phlebitis, etc.)	–	9	1	6	2	2	1	1	–	30	1	5	–	14	1	3	2	5	–	6
Diseases of the lymphatic system (lymphangitis, etc.)	–	–	–	–	6	22	1	4	6	76	3	13	1	19	2	5	–	1	–	4
Hemorrhage without determined cause; other diseases of the circulatory system	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–
Diseases of the Respiratory System:																				
Diseases of the nasal fossae and their adnexa:																				
Diseases of the nasal fossae	–	4	–	4	6	14	1	1	–	4	–	1	–	1	–	–	–	–	–	–
Others	–	–	–	–	–	–	–	–	–	3	–	–	–	6	–	–	–	1	–	–
Diseases of the larynx (except tuberculosis and cancer)	–	–	–	–	–	–	–	–	1	3	–	1	–	–	–	–	–	1	–	–
Bronchitis:																				
Acute	1	15	–	16	8	49	2	5	4	86	1	4	–	10	1	2	11	111	16	79
Chronic	1	6	–	3	5	8	–	1	1	16	–	1	–	2	–	4		3	–	1
Not otherwise defined (under 5 years of age)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	1
Not otherwise defined (5 years and over)	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	3	–	1	–	–
Bronchopneumonia (including capillary bronchitis):																				
Bronchopneumonia	–	5	–	17	–	13	–	3	–	18	–	6	–	5	–	12	–	1	–	1
Capillary bronchitis	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–

TREATED IN HOSPITALS—*Continued*

Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-totals*					Deaths in Hospitals*			
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.			Emp.		Non-Emp.	
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total*	T.	O.	T.	O.
–	–	–	–	1	5	–	1	–	130	5	13	–	4	–	1	1	146	6	17	170	–	–	–	–
1	–	–	–	–	12	–	2	–	–	–	1	–	1	–	–	5	114	1	22	142	–	–	–	–
–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	1	2	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	4	7	–	–	–	–
–	5	–	–	–	3	–	1	2	6	3	24	–	72	–	15	3	141	3	48	195	–	–	–	–
–	2	–	2	3	1	1	–	4	17	1	6	1	18	–	5	12	83*	3*	25	123*	–	–	–	–
–	–	–	–	–	1	–	1	–	3	–	–	–	2	–	–	–	8	–	4	12	–	1	–	–
–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	1	1	–	–	2	–	–	–	–
–	1	–	–	–	–	–	–	1	–	–	–	–	3	–	–	1	11	1	4	17	–	4	–	–
–	–	–	–	–	–	–	–	–	–	–	1	–	3	–	4	–	4	–	10	14	–	3	–	7
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	1	–	1	–	–	1	–	–	–	–	2	1	5	2	4	1	9	16	–	1	–	3
–	6	–	–	–	4	–	3	2	1	–	6	–	11	–	2	4	47	1	36	88	1	17	–	14
–	7	–	2	2	7	1	8	1	3	–	1	–	–	–	–	8	67	4	45	124	1	13	–	11
–	1	–	–	–	1	–	1	–	1	–	–	–	–	–	–	–	4	–	5	9	–	–	–	2
–	–	–	–	–	–	–	1	–	1	–	1	–	–	–	–	–	32	1	14	47	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	1	–	–	–	–
1	1	–	–	3	11	–	1	2	1	1	1	1	–	–	–	11	74*	5	23	113*	–	–	–	–
–	8	2	2	–	11	–	2	5	60	–	9	–	–	2	2	18	197	10	41	266	–	–	–	–
–	1	–	–	–	–	–	–	1	–	1	1	–	–	–	–	1	1	1	3	6	–	–	–	–
–	1	–	–	–	3	–	1	1	4	–	5	2	15	1	7	9	46	2	19	76	–	–	–	–
–	–	–	–	–	1	–	1	–	1	–	1	–	7	1	1	–	19	1	3	23	–	–	–	–
–	1	–	–	–	–	–	–	1	1	–	–	–	4	–	–	2	10	–	1	13	–	–	–	–
–	7	1	2	4	21	4	17	2	47	8	48	8	134	1	25	38	481*	34	198	751*	–	–	–	–
–	1	–	–	2	–	–	–	1	–	–	1	–	12	–	3	10	48	–	14	72	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	4	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	–	3	7	–	–	–	–
–	4	–	3	–	1	–	8	–	13	3	9	–	6	–	5	–	66	3	64	133	–	16	–	27
–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	–	1	–	2	3	–	–	–	–

CLASSIFICATION OF DISEASES

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.
Diseases of the Respiratory System—*Concluded*																				
Pneumonia:																				
Lobar	1	4	–	3	–	33	1	4	–	26	–	9	–	10	–	13	–	30	–	16
Not otherwise specified	–	–	–	–	–	1	–	–	–	1	–	–	–	2	–	5	–	–	–	–
Pleurisy:																				
Pleurisy	–	2	–	1	1	–	–	–	–	14	1	2	–	12	–	4	1	4	–	2
Empyema of thoracic cavity	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	–
Congestion or parenchymatous hemorrhage of the lung	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–
Gangrene of the lung	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Asthma	–	2	–	3	–	2	–	–	–	32	1	3	–	11	–	8	–	1	–	3
Emphysema of the lung	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	2	–	–	–	–
Other diseases of the respiratory system (tuberculosis excepted):																				
Chronic interstitial pneumonia (including occupational diseases of the lungs)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Diseases of the mediastinum	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Others	–	–	–	1	–	–	–	–	–	4	–	1	–	–	–	2	–	–	–	–
Diseases of the Digestive System:																				
Diseases of the mouth and adnexa:																				
Diseases of the teeth and gums	–	9	–	3	1	8	–	1	2	16	–	1	1	13	–	2	–	25	2	11
Other diseases of the buccal cavity and adnexa	1	12	–	2	–	1	–	1	–	3	–	1	–	1	–	1	–	–	–	–
Diseases of the pharynx and tonsils (including adenoids):																				
Streptococcic sore throat	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Ludwig's angina	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tonsillitis	3	23	4	44	–	5	4	2	–	36	–	14	3	11	1	18	3	5	9	12
Adenoids	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	
Others	–	–	–	–	3	2	–	1	–	12	–	1	1	2	–	2	–	13	1	3
Diseases of the esophagus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Ulcer of the stomach and duodenum:																				
Ulcer of the stomach	–	2	–	1	–	–	–	1	–	–	–	1	–	–	–	–	–	2	1	–
Ulcer of the duodenum	–	3	–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	–	–	–
Other diseases of the stomach (cancer excepted):																				
Indigestion	6	22	–	18	1	7	–	7	2	16	–	2	1	6	–	3	18	36	36	42
Gastritis	–	4	–	2	1	1	–	–	2	9	–	1	–	1	–	4	–	–	–	–
Stricture or stenosis of pylorus	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Others	–	1	–	–	1	3	–	–	–	3	–	1	1	4	–	2	–	–	–	1
Diarrhea and enteritis (under 2 years of age)	–	–	–	11	–	–	–	2	–	–	–	9	–	–	–	5	–	–	1	–
Diarrhea and enteritis (2 years and over)	1	4	–	5	4	11	1	1	5	44	–	8	1	6	–	5	4	10	6	13
Ankylostomiasis	–	4	–	3	–	15	–	8	3	118	–	9	–	79	–	24	–	116	–	49
Diseases due to other intestinal parasites:																				
Cestodes (hydatids of the liver excepted)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Trematodes	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Filariasis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1
Ascariasis	–	1	–	–	2	3	–	3	–	4	–	–	1	10	–	9	–	18	–	12
Trichocephalus	–	–	–	1	–	–	–	–	–	–	–	–	–	1	–	1	–	4	1	7
Nematodes not specified	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Parasites not specified	2	3	–	2	–	–	–	–	11	113	–	26	–	1	–	2	–	–	–	–
Appendicitis and typhlitis	3	13	–	55	1	1	1	1	2	16	–	10	2	3	–	5	10	8	5	10
Hernia, intestinal obstruction:																				
Hernia	2	30	–	1	–	4	–	–	2	78	–	10	1	13	2	2	1	13	–	7
Intestinal obstruction	–	1	–	2	–	–	–	–	–	1	–	–	–	1	–	1	–	–	–	–

TREATED IN HOSPITALS—*Continued*

Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-totals*					Deaths in Hospitals*			
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.			Emp.		Non-Emp.	
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total*	T.	O.	T.	O.
–	3	–	5	–	7	–	6	2	23	4	10	–	43	–	14	3	179	5	80	267	1	51	–	31
–	–	–	–	–	–	–	–	–	10	–	6	–	–	–	–	–	14	–	11	25	–	1	–	3
–	2	–	3	–	6	–	2	–	43	1	4	1	10	–	1	3	94*	2	19	118*	–	–	–	–
–	–	–	–	–	–	–	1	–	5	–	–	–	3	–	–	1*	9	–	2	12*	–	–	–	–
–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	4	–	–	4	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	5	–	2	4	14	–	1	1	13	–	2	–	6	–	13	5	86	1	35	127	–	–	–	–
–	–	–	–	1	–	–	–	–	1	–	–	–	–	–	–	1	2	–	2	5	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	2	2	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	5	–	1	–	–	–	4	–	–	–	–	–	9	–	9	18	–	1	–	2
–	6	–	1	2	34	2	6	–	13	3	7	1	11	–	9	7	135	7	41	190	–	–	–	–
–	–	–	–	1	2	–	1	–	1	–	–	1	1	–	5	3	21	–	11	35	–	–	–	–
–	1	–	–	–	–	–	–	–	–	–	–	5	2	–	–	5	3	–	1	9	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	5	–	3	7	9	5	55	5	19	7	15	–	9	–	8	22*	127*	30	171	350*	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	5	5	–	–	–	–
–	2	–	1	–	1	1	2	–	3	–	–	1	7	–	–	5	42	2	10	59	–	–	–	1
–	–	–	–	–	–	–	–	1	–	1	1	–	–	–	–	1	–	1	1	3	–	–	–	1
–	–	–	–	–	3	–	–	–	–	–	2	–	–	–	–	–	7	1	5	13	–	–	–	–
–	–	–	–	–	4	1	1	–	–	–	–	–	–	–	–	–	9	2*	1	12*	–	2	1*	1
–	–	–	1	8	17	–	6	2	19	3	16	6	22	1	2	44	145	40	97	326	–	–	–	–
–	5	–	2	2	7	–	3	–	–	–	1	2	15	–	4	8*	42	–	17	67*	–	–	–	–
–	–	–	–	–	1	–	–	–	–	–	1	–	–	–	–	–	1	–	2	3	–	–	–	–
–	–	–	–	2	4	–	8	–	1	–	1	4	–	–	–	8	16	–	13	37	–	–	–	1
–	–	–	–	–	–	1	3	–	–	–	10	–	–	–	5	–	–	2	45	47	–	–	–	9
–	7	–	–	3	6	1	4	5	21	4	1	7	32	3	3	32*	142*	15	40	229*	–	–	–	2
–	1	–	2	–	1	–	–	2	41	–	15	–	33	–	34	5	408	–	144	557	–	–	–	1
–	–	–	–	–	–	–	–	–	1	–	1	1	–	–	–	1	1	–	1	3	–	–	–	–
–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	–	1	–	–	1	2	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	1	2	4	–	–	–	–
–	1	–	–	–	–	–	–	–	2	3	28	–	6	1	18	3	45	4	70	122	–	–	–	–
–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1	–	6	1	10	17	–	–	–	–
–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	6	–	1	–	6	7	–	–	–	–
–	–	–	–	1	3	2	11	–	1	–	1	–	1	–	2	14	122	2	44	182	–	–	–	–
–	2	–	–	1	8	8	30	1	2	1	6	–	4	–	–	20	57	15	117	209	–	1	2	2
–	3	–	–	–	26	1	5	–	6	5	4	1	19	2	4	7	192	10	33	242	–	2	–	–
–	–	–	–	–	–	1	–	1	1	–	–	1	5	2	1	2	9	3	4	18	–	2	1	–

CLASSIFICATION OF DISEASES

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.
Diseases of the Digestive System—*Concluded*																				
Other diseases of the intestines:																				
Diseases of the anus and stercoral fistulae	–	3	–	2	–	–	–	–	1	4	–	1	–	4	–	3	–	–	–	1
Other diseases of the intestines	–	2	–	1	3	7	–	4	1	8	3	3	–	13	1	5	1	2	–	3
Acute yellow atrophy of the liver	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–
Hydatid tumor of the liver	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cirrhosis of the liver:																				
Returned as alcoholic	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	–
Not returned as alcoholic	–	–	–	–	–	2	–	2	–	5	–	1	–	2	–	–	–	1	–	1
Biliary calculi	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other diseases of the liver:																				
Abscess of the liver, amebic	–	–	–	–	–	2	–	–	–	2	–	1	–	2	–	2	–	–	–	–
Other diseases of the liver	1	4	1	4	1	4	–	1	2	41	2	10	4	17	1	9	–	3	1	1
Diseases of the pancreas (except cancer)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Peritonitis of unstated cause	–	–	–	1	–	–	–	–	–	2	–	1	–	–	–	1	–	1	–	–
Other diseases of the digestive system (cancer and tuberculosis excepted)	–	–	–	–	1	3	1	–	–	1	1	–	–	–	–	–	1	1	–	–
Non-Venereal Diseases of the Genitourinary System and Its Adnexa:																				
Acute nephritis (including unspecified under 10 years of age)	–	–	–	7	–	1	–	–	1	27	2	6	–	1	–	2	–	–	–	–
Chronic nephritis (including unspecified over 10 years of age)	1	18	–	4	–	4	–	1	–	11	–	7	–	14	–	9	4	9	2	13
Chyluria	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other diseases of the kidneys and their adnexa (diseases of the kidney in pregnancy not included)	1	1	–	9	1	–	1	2	–	24	1	28	1	6	4	8	–	2	–	1
Calculi of the urinary passages	–	1	–	–	–	–	–	–	2	–	1	1	–	2	1	2	–	–	–	–
Diseases of the bladder (except tumors)	–	2	–	3	–	–	–	2	–	10	2	5	1	16	–	5	–	–	–	–
Diseases of the urethra, urinary abscess, etc.:																				
Stricture of the urethra	–	6	–	1	–	5	1	–	2	12	–	4	–	7	–	2	–	1	–	–
Others	–	–	–	1	–	3	–	–	1	3	–	1	–	7	–	5	–	1	–	–
Diseases of the prostate (except tumors)	2	1	–	–	1	6	–	–	1	13	1	3	–	4	–	2	–	–	–	–
Non-venereal diseases of the male genital organs	1	10	–	6	–	9	–	–	1	43	1	5	–	23	–	12	6	8	6	5
Cysts and other benign tumors of the ovary	–	–	1	10	–	1	1	2	–	4	–	7	–	–	–	2	–	–	–	2
Salpingitis or pelvic abscess	–	–	–	13	–	1	–	3	–	6	–	35	–	–	–	5	–	1	1	–
Benign tumors of the uterus	–	–	–	5	–	–	–	1	–	–	–	8	–	–	–	1	–	–	–	–
Non-puerperal uterine hemorrhage	–	–	–	8	1	–	1	1	–	–	–	4	–	–	–	–	–	–	–	–
Metritis	–	–	1	16	–	–	–	1	–	–	–	7	–	1	–	2	–	–	–	–
Other diseases of the female genital organs	–	–	1	15	–	1	–	9	–	4	–	35	–	3	–	7	1	6	1	17
Non-puerperal diseases of the breast (cancer excepted)	–	–	–	1	–	–	–	1	–	–	–	–	–	–	–	1	–	–	–	–
The Puerperal State:																				
Accidents of pregnancy:																				
Abortion	–	–	–	26	–	–	1	4	–	–	–	12	–	1	–	13	–	–	–	6
Ectopic gestation	–	–	–	–	–	–	–	–	–	–	–	4	–	–	–	–	–	–	–	–
Other accidents of pregnancy	–	–	–	11	–	–	2	4	–	2	–	2	–	1	–	11	1	1	–	7
Puerperal hemorrhage	–	–	–	1	–	1	–	1	–	–	–	2	–	–	–	–	–	–	–	–

TREATED IN HOSPITALS—*Continued*

Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-totals*				Total*	Deaths in Hospitals*			
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.			Emp.		Non-Emp.	
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.		T.	O.	T.	O.
–	–	–	1	4	8	1	3	1	–	1	5	2	4	2	1	8	23	4	17	52	–	–	–	–
1	4	1	3	–	–	–	1	–	2	–	2	–	–	–	–	6	38	5	22	71	–	4	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	1	–	–	2	1	–	–	–	1	–	–	2	3	–	2	7	–	1	–	1
–	–	–	1	–	1	–	–	–	3	–	2	–	2	–	–	–	17*	–	7	24*	–	9	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	1	–	–	–	–
–	–	–	–	–	4	–	–	–	1	2	6	–	–	–	1	–	11	2	10	23	–	2	–	2
1	–	–	1	–	1	–	1	–	20	2	6	3	21	1	4	12	111	8	37	168	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	2	–	–	2	–	2	–	–
–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	1	–	3	–	6	9	–	2	–	2
–	2	–	–	1	–	–	–	1	1	3	3	–	–	–	–	4	8	5	3	20	–	–	–	–
–	–	–	–	–	–	–	2	1	13	–	5	–	1	–	–	2	43	2	22	69	1	3	–	4
–	8	–	2	–	9	–	4	–	5	1	2	1	10	1	4	6	88	4	46	144	1	18	1	6
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	1	–	3	–	5	–	5	–	2	1	10	1	–	1	1	4	41	8	67	120	–	2	–	5
–	–	–	1	3	3	–	–	1	–	1	1	–	–	–	–	6	7*	3	5	21*	–	–	–	–
–	1	–	1	–	7	–	12	–	2	–	5	1	12	2	3	3*	50	4	36	93*	–	1	–	1
–	9	–	1	–	10	–	4	–	5	–	–	–	6	–	4	2	62*	1	16	81*	–	–	–	–
–	1	–	–	–	2	–	–	1	2	–	–	–	–	–	–	2	19	–	7	28	–	1	–	–
–	1	–	–	–	1	–	2	–	–	–	–	–	1	–	–	4	27	1	7	39	–	–	–	–
–	5	–	1	1	27	1	2	2	6	3	4	–	11	2	1	11	142	13	36	202	–	1	–	–
–	–	–	–	–	–	2	4	–	–	–	–	–	–	–	–	–	5	4	27	36	–	–	–	1
–	3	–	8	–	1	–	17	–	1	–	13	–	–	–	12	–	13	1	106	120	–	–	–	2
–	–	–	1	–	1	–	1	1	–	–	6	–	–	–	4	1	1	–	27	29	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	4	–	–	–	2	1	–	1	19	21	–	–	–	–
–	–	–	1	–	1	–	–	–	2	–	28	–	–	–	–	–	4	1	55	60	–	–	–	–
–	6	1	12	–	1	3	34	–	1	6	38	–	1	2	9	1	23	14	176	214	–	–	–	–
–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	7	7	–	–	–	–
–	–	1	8	–	–	4	25	–	–	4	29	–	–	–	8	–	1	10	131	142	–	–	–	1
–	1	1	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	1	5	7	–	–	–	–
–	–	–	–	–	–	–	4	–	–	3	15	–	–	1	12	1	4	6	66	77	–	–	–	1
–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	–	–	1	–	6	7	–	–	–	–

CLASSIFICATION OF DISEASES

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.
The Puerperal State—*Concluded*																				
Other accidents of childbirth:																				
Cesarian section	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	2
Other surgical operations and instrumental delivery	–	–	1	1	–	–	–	–	–	–	–	2	–	–	1	2	–	–	1	1
Others	–	–	–	–	–	–	–	3	–	1	–	1	–	–	–	–	–	1	3	7
Phlegmasia alba dolens, puerperal embolism, etc.	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–
Puerperal septicemia	–	–	1	6	–	–	–	–	–	–	–	2	–	1	–	4	–	–	–	1
Puerperal albuminuria or convulsions	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Childbirth (without other explanation)	–	–	2	33	–	–	4	18	–	1	4	55	–	–	8	60	–	–	2	3
Puerperal diseases of the breast	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–
Diseases of the Skin and of the Cellular Tissue:																				
Gangrene	–	1	–	1	–	–	–	–	–	–	–	1	–	1	–	1	–	1	–	–
Boil, carbuncle, furuncle	2	7	–	2	6	7	–	1	3	37	1	5	–	10	–	7	4	8	2	5
Phlegmon, acute abscess	1	39	–	19	4	27	–	5	3	130	1	13	–	15	–	30	6	86	13	72
Tinea and alopecia	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Pruritis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other diseases of the skin and its adnexa:																				
Trichophytosis	–	–	–	–	–	–	1	–	–	–	–	–	–	1	–	–	–	–	–	–
Scabies	3	3	–	2	–	–	–	–	–	–	–	–	1	–	–	1	–	4	–	2
Chiggers (pulex penetrans)	1	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Red bug	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Pemphigus contagiosus	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–
Mycetoma	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Ground itch	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	1
Filaria medinensis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Elephantiasis	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	–
Myiosis of skin	–	–	–	–	–	–	–	–	–	–	–	–	–	11	–	1	–	–	–	–
Dhobie itch	–	3	–	–	–	2	–	–	–	7	–	–	1	–	–	1	–	3	–	3
Prickly heat	–	–	–	–	–	1	–	–	–	1	–	–	–	–	–	–	–	–	–	–
Ulcer of the skin	–	7	–	1	–	23	1	1	1	92	1	1	1	44	1	21	–	76	2	45
Ainhum	–	–	–	–	–	1	–	–	–	–	–	–	–	3	–	–	–	–	–	–
Ulcerating granuloma of the pudenda	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
Impetigo contagiosa	–	3	–	–	–	1	–	–	–	3	–	1	2	7	–	2	–	–	–	–
Urticaria	–	1	–	1	1	1	–	–	–	1	–	–	–	1	–	–	–	1	1	–
Other diseases of the skin and adnexa	3	14	–	3	11	27	–	5	4	65	–	5	3	66	1	29	2	20	2	7
Diseases of the Bones and of the Organs of Locomotion:																				
Diseases of the bones (tuberculosis excepted)	–	–	1	7	–	4	–	–	–	6	–	5	–	3	–	–	–	2	–	–
Diseases of the joints (tuberculosis and rheumatism excepted)	1	9	–	1	–	17	–	–	–	14	–	4	1	8	–	3	–	–	–	–
Other diseases of the bones or organs of locomotion	–	–	–	1	1	5	–	–	1	52	–	1	1	15	–	2	–	3	–	1
Malformations:																				
Congenital malformations (stillbirths excepted):																				
Hydrocephalus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Malformations of heart	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Others	–	–	–	–	–	–	–	1	–	–	–	–	–		–	–	–	–	–	–

TREATED IN HOSPITALS—*Continued*

Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-totals*					Deaths in Hospitals*			
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.			Emp.		Non-Emp.	
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total*	T.	O.	T.	O.
–	–	–	2	–	–	–	1	–	–	–	1	–	–	–	1	–	–	–	8	8	–	–	–	1
–	–	–	–	–	–	2	4	–	–	–	1	–	–	–	2	–	–	5	13	18	–	–	–	–
–	–	–	–	–	1	–	7	–	–	–	15	–	–	1	–	–	3	4	33	40	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	3	3	–	–	–	–
–	–	–	–	–	–	–	7	–	–	–	2	–	–	–	3	–	1	1	25	27	–	–	–	13
–	–	–	1	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	5	5	–	–	–	2
–	1	1	21	–	–	5	18	–	–	6	109	–	1	2	85	–	3	34	402	439	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	4	–	–	–	6	6	–	–	–	–
–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	4	7	–	1	–	1
2	8	–	1	2	15	2	7	4	31	1	3	3	12	2	2	26	136*	8	33	203*	–	–	–	1
1	8	–	3	4	41	1	9	5	72	4	20	5	170	2	26	30*	588	21	197	836*	–	1	–	–
–	–	–	–	–	–	–	–	–	–	1	1	–	1	–	2	–	1	1	3	5	–	–	–	–
–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	2	–	–	2	–	–	–	–
–	–	–	–	–	–	–	–	–	14	–	5	2	20	1	2	2	35	2	7	46	–	–	–	–
–	–	–	–	–	3	–	1	1	8	–	3	–	2	–	4	5	20	–	13	38	–	–	–	–
–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	3	3	–	–	6	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	1	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–
–	–	–	–	–	–	–	–	–	2	–	1	–	1	–	–	–	3	1	3	7	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	2	–	–	–	–
–	1	1	–	–	–	–	–	–	1	–	–	–	–	–	–	–	13	1	1	15	–	–	–	–
–	–	–	–	–	–	–	–	–	3	–	–	–	2	–	–	1	20	–	4	25	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	2	–	1	3	–	–	–	–
–	6	–	1	–	22	–	1	2	36	1	14	1	102	–	20	7*	408	6	105	526*	–	1	–	–
–	–	–	–	–	–	–	1	–	1	–	–	–	1	–	–	–	6	–	1	7	–	–	–	–
–	–	–	–	–	–	–	–	1	3	–	2	–	3	–	1	1	7	–	3	11	–	–	–	–
–	–	–	–	2	1	2	1	–	–	–	–	–	9	–	4	4	24	2	8	38	–	–	–	–
–	–	–	–	–	–	–	3	–	3	1	–	–	1	–	–	1	9	2	4	16	–	–	–	–
–	10	–	1	2	13	2	4	3	31	2	7	–	29	–	6	28	275	7	67	377	–	–	–	–
–	6	–	2	–	8	–	2	–	1	–	–	–	3	–	–	–	33	1	16	50	–	–	–	–
–	6	–	4	–	8	1	3	–	16	1	5	1	8	1	1	3	86	3	21	113	–	1	–	–
–	–	–	–	2	–	–	2	–	145†††	–	9†††	–	4	–	1	5	224	–	17	246	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	2	–	–	–	4	4	–	–	–	–

CLASSIFICATION OF DISEASES

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.
Diseases of Early Infancy:																				
Congenital debility, icterus and sclerema:																				
Marasmus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	3
Inanition	–	–	–	1	–	–	–	1	–	–	–	–	–	–	–	2	–	–	–	–
Icterus	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–
Sclerema	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Others	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–
Premature birth, or consequence of labor:																				
Premature birth	–	–	–	3	–	–	–	3	–	–	–	1	–	–	–	1	–	–	–	–
Injury at birth	–	–	–	1	–	–	–	–	–	–	–	3	–	–	–	2	–	–	–	–
Other diseases peculiar to early infancy:																				
Asphyxia neonatorum	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Atalectasis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Umbilical infection	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Umbilical hemorrhage	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Others	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–
Lack of care	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Old Age:																				
Old age	–	–	–	–	–	1	–	–	–	–	–	–	–	3	–	–	–	–	–	–
External Causes:																				
Suicide (burns)	–	–	–	8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Suicide (firearm)	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Suicide (poisoning)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Poisoning by food	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–
Poisoning by venomous animals	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–
Snake bite	–	–	–	–	–	7	1	2	–	2	–	–	–	2	–	6	–	1	–	2
Other acute poisonings	–	–	–	1	1	–	–	–	–	–	–	–	–	–	–	2	–	1	–	–
Burns and scalds	1	2	–	5	–	3	–	–	1	10	–	–	1	5	–	1	–	1	–	10
Mechanical suffocation	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Absorption of irrespirable or poisonous gas	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Accidental drowning	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Injury by firearms	–	3	–	1	–	–	–	–	–	5	–	10	–	5	–	7	–	8	–	6
Injury by cutting or piercing instruments	4	136	–	9	1	75	1	1	–	109	–	14	–	84	–	40	4	88	2	41
Injury by falls	1	12	1	–	2	21	–	1	2	17	1	5	6	41	–	20	5	58	8	39
Traumatism by machines	–	7	–	2	–	–	–	–	–	7	–	–	–	8	1	1	–	–	–	–
Traumatism by other crushing (vehicles, railways, landslides, etc.)	4	20	1	2	6	52	–	–	–	14	1	13	–	33	–	12	1	31	–	36
Injuries by animals (not poisoning)	–	3	–	1	–	4	–	–	–	9	–	2	–	9	–	–	1	7	–	1
Overexertion	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Starvation	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Effects of heat	–	–	–	–	1	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–
Lightning	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Electricity	1	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–
Homicide by firearms	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1
Homicide by cutting or piercing instruments	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	–	2
Homicide by other means	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
Infanticide	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Dislocations	–	–	–	1	–	–	–	–	2	4	2	1	–	–	–	2	–	–	–	1
Sprains	1	5	–	1	–	1	–	1	2	1	–	1	–	2	–	–	–	–	–	–
Fractures (cause not specified)	1	7	–	6	–	1	–	–	–	16	3	19	–	2	–	–	–	–	1	1
Other external violence:																				
Criminal abortion	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Explosions	–	–	–	–	–	–	–	–	1	5	–	2	–	1	–	2	–	–	–	–
Salvarsan injection	–	–	–	–	–	–	–	–	–	–	–	–	–	27	–	–	–	–	–	–

TREATED IN HOSPITALS—*Continued*

Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-totals*					Deaths in Hospitals*			
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.			Emp.		Non-Emp.	
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total*	T.	O.	T.	O.
–	–	–	–	–	–	–	–	–	–	–	4	–	–	–	4	–	–	–	12	12	–	–	–	7
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	4	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	4	4	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	2	–	–	–	1	–	–	–	–	–	–	–	5	5	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	10	10	–	–	–	6
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	8	8	–	–	–	5
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	1	2	–	–	–	–
–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	5	–	–	–	6	6	–	–	–	1
–	–	–	2	–	1	–	1	–	–	1	–	1	–	–	–	1	5	1	3	10	–	3	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8	8	–	–	–	8
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	1
–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	2*	–	–	1	3*	–	–	–	–
–	–	–	–	–	–	–	–	–	3	–	2	–	1	–	–	–	5	–	2	7	–	–	–	–
–	14	–	3	–	–	–	–	1	–	–	–	–	–	–	–	1	26	1	13	41	–	–	–	–
–	–	–	1	–	–	–	–	–	1	–	1	–	2	–	1	1	5*	–	6	12*	–	–	–	1
–	–	–	3	1	4	–	3	1	8	–	4	–	4	1	1	5	37	1	27	70	1	3	1	3
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	1	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	2	–	1	–	1	–	1	–	28	2	26	1	20	–	17	1	72	2	69	144	–	11	–	9
–	31	–	4	3	162	–	9	2	112	–	18	–	142	2	11	14	939	6*	147	1106*	1	6	–	2
–	6	–	7	–	1	–	1	1	42	3	5	–	45	1	6	19*	244*	16*	84	363*	–	4	–	–
–	–	–	–	–	–	–	–	–	6	–	1	2	9	–	1	2	38*	2*	5	47*	–	–	–	–
1	–	1	2	–	3	–	–	4	35	1	9	1	21	–	3	17	209	4	77	307	–	5	–	8
–	–	–	–	–	–	–	–	1	4	1	1	1	8	–	1	3	44	1	6	54	–	–	–	–
–	–	–	–	–	–	–	–	–	1	–	–	–	2	–	–	–	3	–	–	3	–	–	–	–
–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	–
1	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	3	1	–	–	4	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	2	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	2	–	1	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	–	2	6	–	4	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	3	–	–	–	1	–	2	–	2	–	–	2	10	2	7	21	–	–	–	–
–	3	–	–	1	3	–	–	3	17	1	1	3	16	1	–	11*	48	2	4	65*	–	–	–	–
–	–	–	3	1	39	–	13	6	9	1	8	1	27	–	2	9	101	5	52	167	1	3	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	2	–	–	–	–	–	–		–	–	–	–	–	–	2	1	8	–	6	15	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	28	–	–	28	–	–	–	

CLASSIFICATION OF DISEASES

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.
External Causes—*Concluded*																				
Other medicaments (injections)	–	–	–	–	–	–	–	–	–	2	1	–	–	–	–	–	–	–	–	1
Other external violence	–	–	–	1	2	1	1	–	1	91	1	7	3	70	–	16	–	–	–	1
Ill-Defined Diseases:																				
Sea sickness	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Ill-defined organic diseases	–	–	–	–	–	–	–	–	–	8	1	–	–	–	–	1	–	–	–	–
Sudden death	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
†No disease; malingering	–	1	3	32	2	3	–	24	–	16	–	66	–	–	–	96	–	–	4	24
Infections of undetermined origin	1	–	–	1	–	3	–	–	–	5	–	1	–	1	–	1	–	–	1	3
TOTALS	81	766	23	667	219	1147	43	293	143	3382	62	756	73	1613	68	1140	124	1748	194	1217

NOTE.—This table gives only *cases* treated in our Hospitals and does not show the *number of treatments*.

* Including Jamaica Division—See Explanatory Notes on page 275.

† Under "No disease; malingering" are included (a) infants born in the Hospital, nursling babies, well mothers who entered the Hospital with ill babies, and babies who were admitted with ill mothers; and (b) patients who were found to be without physical ailment of any kind, or who were malingering.

†† Under the classification "Diseases of the Spleen," the Colombia Division has included "cases of 'Colombian Spleen' who, aside from the enlarged spleen, show not the least evidence of malaria—no fever, chills, nor positive blood findings." The Truxillo Railroad Company Division has included in the same group "cases who have had quinine in camp and whose bloods are negative; although the clinical history is that of malaria, and their spleens are very much enlarged, and malaria treatment has resulted in their speedy recovery."

††† Including cases of myalgia, without any other physical findings or pathological signs.

TREATED IN HOSPITALS—*Concluded*

Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-totals*					Deaths in Hospitals*			
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.			Emp.		Non-Emp.	
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total*	T.	O.	T.	O.
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	1	1	4	–	–	–	–
–	19	1	5	10	82	2	9	–	1	–	2	–	5	–	1	16	269	5	42	332	–	1	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	1	6	–	3	1	6	–	4	2	20	1	8	31	–	1	–	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1	2	–	31	10	38	10	51	3	50	16	151	2	45	2	112	18	155	35	587	795	–	–	–	–
–	1	–	3	1	1	–	5	5	40	8	8	1	8	1	6	8	59	10	28	105	–	5	–	5
18	417	13	248	126	1076	79	612	153	2657	175	1317	145	2715	66	1046	1113*	15552*	731*	7296	24692*	14	368	16*	352

CLASSIFICATION OF TREATMENTS

Note: This table shows the number of treatments administered at the Hospital

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.
Epidemic, Endemic or Infectious Diseases:																				
Malaria or cachexia (No. 5).	1	324	–	503	262	968	67	307	266	5860	10	247	23	1051	4	443	214	1146	215	500
Influenza (No. 11)	61	1463	29	1948	4	18	2	5	287	4238	9	154	19	560	4	50	13	47	13	13
Dysentery (No. 16). . . .	–	6	–	–	–	22	–	6	95	1858	9	198	11	190	1	153	–	–	–	–
Venereal infections (Nos. 38 to 40, incl.)	34	346	–	57	67	540	12	119	128	2926	19	375	29	1379	7	358	–	203	–	47
Other endemic or infectious diseases (Nos. 1 to 42, incl., excepting Nos. 5, 11, 16, and 38 to 40, incl.).	2	79	–	208	5	6	–	1	–	155	1	71	7	71	–	39	–	–	–	–
General Diseases Not Included Above:																				
Cancer (Nos. 43 to 49, incl.).	–	–	–	–	–	–	–	–	–	–	–	2	–	8	–	1	–	–	–	–
Benign tumors, and tumors not returned as malignant (No. 50).	2	55	–	70	–	–	–	–	1	49	2	5	–	6	–	6	–	–	–	–
Rheumatism or gout (Nos. 51 and 52)	28	594	–	262	–	6	–	–	107	2232	4	83	28	888	7	69	61	350	37	130
Anemia, chlorosis (No. 58).	7	649	23	1370	–	1	–	1	1	537	–	71	74	198	14	93	–	–	–	–
Other general diseases (Nos. 43 to 69, incl., excepting Nos. 43 to 52, incl., and No. 58) .	4	15	–	33	–	2	–	5	3	123	10	111	–	17	2	12	–	–	–	–
Diseases of the Nervous System and of the Organs of Special Sense:																				
Diseases of the nervous system (Nos. 70 to 84, incl.)	15	390	9	488	5	15	2	2	5	808	7	157	9	157	11	48	–	–	–	–
Diseases of the organs of vision and adnexa (No. 85)	12	414	8	444	12	45	5	9	54	1221	10	135	6	267	5	25	24	94	12	34
Diseases of the organs of hearing and the mastoid process (No. 86) .	17	84	1	148	21	29	2	24	11	164	12	63	38	174	2	33	12	36	–	14
Diseases of the Circulatory System:																				
Organic diseases of the heart (Nos. 87 to 90, incl.).	5	126	–	89	3	13	1	19	1	68	1	56	2	44	–	38	–	–	–	–
Other diseases of the circulatory system (Nos. 87 to 96, incl., excepting Nos. 87 to 90, incl.).	2	99	–	62	8	99	–	36	1	335	9	96	39	301	1	38	–	–	–	–
Diseases of the Respiratory System:																				
Bronchitis (No. 99). . . .	42	440	21	965	69	262	19	41	11	2162	17	224	9	548	5	93	87	226	65	103
Pneumonia and pleurisy (Nos. 100 to 102, incl.).	–	36	–	125	–	–	–	1	–	81	–	19	–	30	–	20	–	–	–	–
Other diseases of the respiratory system (Nos. 97 to 107, incl., excepting Nos. 99 to 102, incl.).	5	161	1	325	68	229	7	22	8	779	13	134	19	248	2	33	–	–	–	–
Diseases of the Digestive System:																				
Diseases of the mouth and adnexa (No. 108). . .	4	575	3	661	12	112	3	36	29	1186	19	52	1	138	3	30	3	117	–	17
Diarrhea and enteritis (Nos. 113 and 114) . .	5	145	7	915	11	78	3	19	10	290	12	282	2	78	1	92	3	7	1	5
Ankylostomiasis (No. 115).	–	28	–	316	6	69	3	24	31	1039	–	130	–	6	–	6	–	–	–	–

IN HOSPITAL DISPENSARIES

Dispensaries (by qualified physicians), and does not record the number of cases

Jamaica Division				Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-Totals				
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total
112	2362	3	617	18	316	6	202	24	915	8	1317	153	1534	126	781	32	785	6	350	1105	15261	445	5267	22078
109	560	30	68	17	174	2	33	30	339	8	625	66	481	151	302	3	5	3	1	609	7885	251	3199	11944
1	12	–	2	–	5	–	1	–	1	–	5	24	307	86	278	1	25	–	25	132	2426	96	668	3322
26	293	2	9	–	992	1	189	11	181	2	66	367	1230	114	515	37	775	8	261	699	8865	165	1996	11725
–	77	–	25	8	14	–	31	–	10	–	35	4	46	1	140	4	5	–	20	30	463	2	570	1065
–	1	–	–	–	27	–	1	–	–	–	1	15	1	1	6	–	–	–	21	15	37	1	32	85
–	–	–	–	2	31	–	9	–	–	–	–	–	–	–	–	12	1	2	8	17	142	4	98	261
5	220	3	5	14	154	–	28	10	206	4	131	4	45	10	32	9	62	3	8	266	4757	68	748	5839
47	136	37	31	–	2	1	3	3	26	1	222	12	122	52	313	2	37	–	30	146	1708	128	2134	4116
14	17	7	14	1	13	2	7	7	61	9	80	81	201	61	187	–	9	–	7	110	458	91	456	1115
33	413	21	37	6	66	2	22	14	221	9	290	37	112	28	126	21	63	10	60	145	2245	99	1230	3719
14	287	11	18	25	79	–	19	29	237	12	171	70	370	55	156	49	236	22	99	295	3250	140	1110	4795
27	164	17	17	15	28	2	25	10	31	6	61	129	354	138	362	27	56	72	32	307	1120	252	779	2458
9	19	4	–	–	35	1	33	1	11	2	30	1	30	1	9	1	4	1	11	23	350	11	285	669
1	107	10	10	4	71	5	18	2	70	–	76	80	289	29	132	–	7	1	3	137	1378	55	471	2041
2	96	–	1	4	84	5	38	56	205	35	415	57	918	53	561	161	732	36	324	498	5673	256	2765	9192
3	60	2	1	–	14	–	20	1	69	–	76	–	28	5	31	–	3	1	11	4	321	8	304	637
32	421	7	100	20	238	17	124	15	90	4	137	65	276	33	161	82	457	13	130	314	2899	97	1166	4476
5	235	24	15	7	135	2	34	4	152	5	133	11	130	5	88	10	175	17	72	86	2955	81	1138	4260
21	31	6	21	3	18	1	10	7	69	31	534	27	162	46	195	14	78	1	106	103	956	109	2179	3347
–	16	–	2	1	40	1	64	–	1	–	1	12	164	15	212	–	2	–	23	50	1365	19	778	2212

CLASSIFICATION OF TREATMENTS

Note: This table shows the number of treatments administered at the Hospital

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica				Guatemala Division			
	Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.	
	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.
Diseases of the Digestive System—*Concluded*																				
Other diseases of the digestive system (Nos. 108 to 127, incl., excepting No. 108, and Nos. 113 to 115, incl.).	74	1162	49	2459	85	233	17	45	393	5902	70	966	122	1186	25	336	169	217	162	123
Non-Venereal Diseases of the Genitourinary System and Its Adnexa:																				
Nos. 128 to 142, incl. . . .	5	196	1	845	6	114	7	90	9	545	34	697	12	333	14	262	–	–	–	–
The Puerperal State:																				
Nos. 143 to 150, incl. . . .	–	–	2	252	–	–	3	8	–	6	2	33	–	2	3	48	–	–	–	–
Diseases of the Skin and of the Cellular Tissue:																				
Boil, carbuncle, furuncle (No. 152)	2	276	1	272	44	128	5	10	43	758	17	52	28	86	–	89	2	10	–	1
Phlegmon, acute abscess (No. 153)	19	986	4	889	42	201	10	34	17	1221	9	221	4	230	3	143	6	91	–	9
Ground itch	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	1	–	–	–	–
Ulcer of the skin	–	225	–	98	15	418	–	82	22	4678	–	52	5	1682	31	397	5	533	4	125
Other diseases of the skin or cellular tissue, and adnexa (Nos. 151 to 154, incl., excepting Nos. 152 and 153, and "Ground itch" and "Ulcer of the skin") .	77	969	32	1292	116	250	27	42	328	2210	34	303	51	1466	14	343	127	1	89	1
Diseases of the Bones and of the Organs of Locomotion:																				
Nos. 155 to 158, incl. . . .	2	39	2	51	3	77	1	9	1	664	6	42	1	139	1	4	–	–	–	–
Malformations:																				
No. 159	–	–	–	1	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–
Diseases of Early Infancy:																				
Nos. 160 to 163, incl. . . .	–	–	–	80	–	–	–	1	–	–	–	24	–	–	–	3	–	–	–	–
Old Age:																				
No. 164	–	9	–	16	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
External Causes:																				
Injury by firearms (No. 183)	–	–	–	1	–	–	–	–	–	17	–	1	–	–	32	6	–	16	–	3
Injury by cutting or piercing instruments, and by falls (Nos. 184 and 185).	91	4927	4	943	129	684	15	32	80	2575	3	104	13	681	8	165	–	45	–	6
Traumatism by machines and other means (Nos. 187 and 188)	149	899	2	126	80	380	7	23	–	646	–	49	23	480	1	4	1	23	–	6
Dislocations, sprains, fractures (No. 201)	7	23	–	37	4	45	–	–	–	26	–	37	1	19	–	10	–	–	–	–
Other external causes (Nos. 165 to 203, incl., excepting Nos. 183 to 185, incl., 187, 188, and 201)	16	396	5	284	24	330	10	105	22	1050	2	45	14	809	3	94	3	128	–	12
***Ill-Defined Diseases:**																				
*Nos. 204 and 205	47	464	65	4503	22	241	22	218	2	396	13	179	138	472	110	686	–	–	–	–
TOTALS	735	16600	269	21138	1123	5615	250	1376	1966	46805	354	5471	728	13946	314	4271	730	3290	598	1149

NOTE.—This table shows the number of *treatments*, and not the number of *cases* treated, in our Hospital Dispensaries. The universally by public-health and city and state health departments and organizations.

* Under "Ill-Defined Diseases" (Charts Nos. 204 and 205) some Divisions have included (a) persons who were found to be with- tions of prospective employees and of aliens who were prospective passengers aboard the steamships; (d) laboratory examinations who came for periodical examinations; and (f) persons who came to the dispensaries without any stated or ascertained symptoms

IN HOSPITAL DISPENSARIES—*Concluded*

Dispensaries (by qualified physicians), and does not record the number of cases

Jamaica Division				Panama Division				Preston Division				Tela Railroad				Truxillo Railroad				Semi-Totals				
Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		Emp.		Non-Emp.		
T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	T.	O.	Total
104	1354	85	194	43	260	12	148	110	650	46	1076	177	1001	171	701	195	786	68	373	1472	12751	705	6421	21349
20	332	12	23	4	227	13	174	12	102	11	462	95	241	131	536	39	125	13	261	202	2215	236	3350	6003
–	22	–	1	–	1	3	32	–	–	3	47	–	15	82	145	–	–	5	46	–	46	103	612	761
7	171	4	1	36	67	1	4	24	152	–	63	370	811	178	524	2	39	14	17	558	2498	220	1033	4309
13	241	11	8	8	49	9	58	31	549	13	384	219	1024	90	639	58	716	52	473	417	5308	201	2858	8784
–	–	–	–	–	–	–	–	–	–	–	1	5	31	5	20	5	27	–	11	10	60	5	33	108
10	688	1	66	22	217	1	67	–	271	1	360	66	868	95	510	6	588	11	205	151	10168	144	1962	12425
58	370	15	79	50	186	24	132	100	471	13	736	242	1140	249	775	264	883	325	488	1413	7946	822	4191	14372
6	68	3	1	2	95	4	42	–	5	–	2	12	270	11	60	32	263	8	39	59	1620	36	250	1965
–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	4	–	–	–	–	–	–	–	7	7
–	–	2	8	–	–	–	17	–	–	–	46	–	–	–	–	–	–	–	11	–	–	2	190	192
–	2	–	–	–	3	–	2	–	2	2	2	–	–	–	–	–	1	–	–	–	17	2	20	39
–	–	–	–	–	12	–	22	–	–	–	–	–	106	–	13	–	44	–	28	–	195	32	74	301
40	1726	43	66	1	210	–	62	368	2809	12	790	88	1096	96	506	23	899	25	93	833	15652	206	2767	19458
2	248	5	1	13	11	1	14	27	839	1	145	28	175	10	21	4	131	2	13	327	3832	29	402	4590
8	146	3	9	–	25	–	15	1	60	–	32	3	46	10	8	5	36	2	6	29	426	15	154	624
15	303	3	18	29	491	14	84	218	1327	10	412	47	235	22	103	5	132	6	29	393	5201	75	1186	6855
30	193	56	1744	166	330	82	371	21	99	3	256	50	64	39	39	317	723	120	682	793	2982	510	8678	12963
774	11391	427	3212	519	4720	212	2155	1136	10231	251	9221	2617	13923	2199	9191	1420	8910	847	4377	11748	135431	5721	61561	214461

chart numbers used are taken from the "International List of Causes of Sickness and Death." These chart numbers are used

out physical ailment of any kind, or who were malingering; (b) vaccinations against smallpox and typhoid; (c) medical examina-
made upon request, with no physical examination of the individual from whom the specimen was obtained; (e) obstetrical patients
or physical signs of disease, but who obtained medicines, surgical supplies, special foods for infants, and other similar articles.

CONSOLIDATED SU

	Banes Division		Chiriqui Land Co.		Colombia Division		Cia. Bananera Costa Rica	
	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.
Bones, Operations On:								
Skull, fracture of	–	–	–	–	–	–	1	–
Craniectomy, decompressive	–	–	–	–	–	–	–	–
Bone graft	2	–	–	–	–	–	–	–
Fractures, simple	6	15	20	9	2	1	22	10
Fractures, comminuted	3	–	–	–	–	–	2	–
Fractures, compound	–	–	5	1	3	–	4	–
Laminectomy	–	–	–	–	–	–	1	–
Operations for reduction of fractures	–	–	1	1	4	–	–	–
Osteotomy	2	–	2	–	2	–	–	1
Osteectomy	–	–	–	–	4	–	2	–
Resection of elbow	–	–	–	–	–	–	–	–
Resection, others	–	–	1	–	–	–	–	–
Trephining for cerebral abscess	–	–	–	–	–	–	–	–
Others	1	–	1	–	16	–	–	–
Chest, Operations On:								
Breast abscess, incision of	1	4	2	1	–	–	4	4
Breast, excision of	1	–	–	–	–	–	2	–
Breast and axilla, excision of	–	–	–	–	1	–	–	–
Thoracotomy	1	–	–	–	1	–	7	–
Others	–	–	1	–	1	–	7	–
Laparotomy:								
Abdomen, penetrating wound of	–	–	–	–	–	–	1	–
Abscess of liver, laparo-hepatotomy	–	–	–	–	–	–	–	–
Abscess of liver, thoraco-hepatotomy	–	–	–	–	1	–	2	–
Abscess, subphrenic	–	–	–	–	–	–	–	–
Appendectomy with local peritonitis	77	–	2	–	20	–	6	–
Appendectomy with general peritonitis	4	–	1	–	10	–	–	–
Cholecystectomy	1	–	–	–	–	–	–	–
Cholecystotomy	–	–	–	–	1	–	1	–
Colostomy	–	–	–	–	2	–	–	–
Ectopic gestation	–	–	–	–	3	–	–	–
Enterectomy	–	–	–	–	–	–	1	–
Entero-enterostomy	–	–	–	–	2	–	–	–
Enterorrhaphy	–	–	–	–	–	–	2	–
Exploratory	1	–	–	–	5	–	4	–
Gastro-enterostomy	1	–	–	–	–	–	–	–
General peritonitis	–	–	–	–	–	–	–	–
Hysterectomy supravaginal	9	–	–	–	27	–	1	–
Hysterectomy vaginal	–	–	–	–	–	–	–	–
Pan-hysterectomy	6	–	–	–	–	–	–	–
Hystero-myomectomy	–	–	–	–	4	–	–	–
Hysteropexy	2	–	–	–	9	–	–	–
Hysteropexy with perineorrhaphy	2	–	–	–	–	–	1	–
Intestinal obstruction	1	–	–	–	–	–	1	–
Myomectomy	1	–	–	–	2	–	–	–
Ovarian cystectomy	2	–	2	–	5	–	–	–
Oophorectomy, complete	10	–	–	–	–	–	–	–
Oophorectomy, partial		–	–	–	–	–	–	–
Paracentesis abdominalis	5	–	–	–	5	–	4	–
Partial resection of stomach	–	–	–	–	–	–	–	–
Salpingectomy	17	–	–	–	6	–	–	–
Salpingo-oophorectomy	4	–	1	–	10	–	–	–
Splenectomy	–	–	–	–	1	–	–	–
Talma's operation	–	–	–	–	1	–	–	–
Others	1	–	–	–	22	–	1	–
Obstetrical:								
Abortions	11	1	2	–	12	–	2	–
Births, premature	1	–	3	–	1	–	6	–
Births, normal	22	1	22	–	58	–	44	–
Births, multiple	3	–	–	–	–	–	1	–

GICAL REPORT

Guatemala Division		Jamaica Division		Panama Division		Preston Division		Tela Railroad		Truxillo Railroad		Totals		Post-Operative Deaths
osp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	
–	–	–	–	–	–	–	–	1	–	3	–	5	–	–
1	–	–	–	–	–	–	–	–	–	2	–	3	–	2
4	–	–	–	–	–	–	–	4	–	–	–	10	–	–
9	–	–	11	–	–	52	29	33	5	22	5	166	85	–
1	–	–	–	1	–	–	–	8	–	1	–	16	–	–
8	–	–	3	–	–	–	–	8	–	5	–	33	4	–
–	–	–	–	–	–	–	–	1	–	1	–	3	–	1
–	–	–	–	–	–	–	–	2	–	2	–	9	1	–
1	–	–	–	–	–	–	–	–	–	–	–	7	1	–
1	–	–	–	–	–	1	–	2	–	2	–	12	–	–
1	–	–	–	–	–	–	–	–	–	1	–	2	–	–
2	–	–	–	–	–	–	–	–	–	7	–	10	–	1
–	–	–	–	–	–	1	–	–	–	–	–	1	–	1
–	–	–	–	2	–	–	–	–	–	–	–	20	–	–
2	–	–	–	1	–	1	–	–	5	4	6	15	20	–
–	–	–	–	–	–	1	–	–	–	–	–	4	–	–
–	–	–	–	1	–	–	–	–	–	–	–	2	–	–
1	–	–	–	–	–	1	–	2	–	3	–	16	–	1
–	–	–	–	2	–	–	–	3	–	1	–	15	–	–
1	–	–	–	–	–	–	–	3	–	1	–	6	–	1
2	–	–	–	–	–	–	–	–	–	–	–	2	–	–
–	–	–	–	–	–	2	–	–	–	1	–	6	–	1
–	–	–	–	–	–	1	–	–	–	–	–	1	–	–
26	–	–	–	1	–	67	–	15	–	3	–	217	–	2
9	–	–	–	–	–	1	–	–	–	–	–	25	–	2
1	–	–	–	–	–	1	–	–	–	–	–	3	–	–
–	–	–	–	–	–	3	–	–	–	–	–	5	–	1
–	–	–	–	–	–	–	–	–	–	–	–	2	–	–
1	–	–	–	–	–	–	–	1	–	–	–	5	–	–
–	–	–	–	–	–	–	–	1	–	–	–	2	–	–
–	–	–	–	–	–	2	–	–	–	–	–	4	–	–
–	–	–	–	–	–	4	–	1	–	–	–	7	–	–
2	–	–	–	1	–	4	–	2	–	2	–	21	–	6
–	–	–	–	–	–	1	–	–	–	–	–	2	–	1
1	–	–	–	–	–	1	–	1	–	1	–	4	–	1
1	–	–	–	–	–	11	–	3	–	3	–	55	–	–
–	–	–	–	–	–	3	–	–	–	–	–	3	–	–
–	–	–	–	–	–	5	–	–	–	3	–	14	–	2
–	–	–	–	–	–	–	–	3	–	–	–	7	–	–
3	–	–	–	–	–	3	–	–	–	–	–	17	–	–
–	–	–	–	–	–	–	–	–	–	1	–	4	–	–
–	–	–	–	–	–	–	–	–	–	–	–	2	–	–
–	–	–	–	–	–	1	–	–	–	–	–	4	–	–
3	–	–	–	–	–	–	–	–	–	–	–	12	–	2
3	–	–	–	–	–	2	–	–	–	–	–	} 25	–	–
	–	–	–	–	–	10	–	–	–	–	–		–	–
–	–	–	–	1	–	–	–	4	–	–	–	19	–	1
–	–	–	–	–	–	3	–	–	–	–	–	3	–	–
4	–	–	–	1	–	7	–	–	–	–	–	35	–	–
6	–	–	–	–	–	14	–	4	–	–	–	39	–	1
–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	1	–	1
1	–	–	–	–	–	6	–	1	–	1	–	33	–	1
1	–	–	–	–	–	1	2	24	–	3	–	56	3	2
–	–	–	–	–	–	–	–	2	–	10	–	23	–	1
13	–	–	–	25	–	13	–	116	–	68	–	381	1	–
–	–	–	–	–	–	–	–	4	–	1	–	9	–	–

CONSOLIDATED SURC

	Banes Division		Chiriqui Land Co.		Colombia Division		Cia. Bananer Costa Rica	
	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp Disp
OBSTETRICAL—*Concluded:*								
Births, forceps operations	3	–	–	–	2	–	6	–
Births, abnormal presentations	3	–	–	–	1	–	1	–
Births, versions	–	–	–	–	–	–	–	–
Births, episiotomy	–	–	–	–	–	–	2	–
Births, Cesarian operations	–	–	–	–	–	–	1	–
Repairs of perineum	–	–	–	–	1	–	4	–
Others	–	–	1	–	7	–	4	–
GENITOURINARY TRACT:								
Chancroid operations	4	2	10	28	–	–	1	–
Circumcisions	12	1	2	–	16	6	17	–
Curettage uteri	–	–	2	–	24	–	2	–
Cystotomy	24	–	–	–	3	–	2	–
Epididymectomy	–	–	–	–	–	–	–	–
Epididymotomy	–	–	–	–	–	–	–	–
Hydrocele, single, radical cure	1	–	1	–	10	–	8	–
Hydrocele, double, radical cure	–	–	–	–	1	–	3	–
Nephrectomy	–	–	–	–	–	–	–	–
Orchidectomy	–	–	–	–	3	–	3	–
Penis, operations on	1	–	7	4	2	–	4	–
Perineorrhaphy	4	–	–	–	8	–	–	–
Perinephritic abscess	–	–	–	–	1	–	1	–
Prostatectomy	1	–	–	–	–	–	1	–
Scrotum operations	–	–	1	–	8	–	7	–
Trachelorrhaphy	–	–	–	–	–	–	–	–
Vaginal puncture for pelvic cellulitis	–	–	–	–	13	–	–	–
Vaginal operations	4	–	–	–	51	–	2	–
Varicocele, radical cure	–	–	–	–	2	–	–	–
Urethrotomy, internal	1	–	–	–	–	–	–	–
Urethrotomy, external	–	–	–	–	1	–	5	–
Others	–	–	40	71	26	–	24	4
HERNIOTOMY:								
Epigastric	–	–	–	–	3	–	–	–
Femoral	–	–	–	–	2	–	–	–
Inguinal, single	26	–	4	–	67	–	5	1
Inguinal, double	3	–	–	–	12	–	2	–
Strangulated	1	–	–	–	3	–	–	–
Umbilical	–	–	–	–	1	–	–	–
Ventral	–	–	–	–	4	–	–	–
ADENECTOMY:								
Axillary	1	–	–	8	–	–	–	–
Cervical	1	–	1	–	1	–	–	–
Femoral	–	–	3	–	5	–	–	–
Inguinal, single	2	1	18	12	53	12	4	–
Inguinal, double	–	–	4	–	6	–	–	–
AMPUTATIONS:								
Hand	–	–	–	–	–	–	1	–
Forearm	–	–	–	–	1	–	–	–
Arm	–	–	–	–	1	–	–	–
Thigh	1	–	–	–	1	–	1	–
Leg	3	–	1	–	2	–	1	–
Foot	–	–	–	–	–	–	2	–
Digits, multiple	15	3	4	1	7	2	13	4
JOINTS, OPERATIONS ON:								
Arthrotomy	–	–	1	–	2	–	–	–
Reduction of dislocation	–	8	1	–	2	–	1	1
Others	1	1	18	40	10	–	–	–

L REPORT—*Continued*

Guatemala Division		Jamaica Division		Panama Division		Preston Division		Tela Railroad		Truxillo Railroad		Totals		Post Operative Deaths
osp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	
3	–	–	–	–	–	3	–	2	–	3	–	22	–	–
–	–	–	–	–	–	–	–	3	–	2	–	10	–	–
–	–	–	–	–	–	6	–	4	–	–	–	10	–	1
–	–	–	–	–	–	–	–	–	–	6	–	8	–	–
3	–	–	–	2	–	2	–	1	–	1	–	10	–	1
–	–	–	–	–	–	–	–	–	–	5	–	10	–	–
–	–	–	–	2	–	2	–	2	–	2	–	20	–	1
2	–	–	–	–	–	–	–	33	14	1	–	51	44	–
1	–	–	–	2	1	8	–	14	–	6	1	88	9	–
2	–	–	–	3	–	35	–	13	–	2	–	83	–	–
–	–	–	–	2	–	3	–	1	–	1	–	36	–	1
–	–	–	–	–	–	–	–	–	–	1	–	1	–	–
1	–	–	–	–	–	–	–	13	–	1	–	15	–	–
3	–	–	5	1	–	12	–	–	–	2	–	38	5	–
–	–	–	–	–	–	–	–	–	–	–	–	4	–	–
1	–	–	–	–	–	1	–	1	–	–	–	3	–	–
2	–	–	–	–	–	3	–	–	–	–	–	11	–	–
2	–	–	–	–	–	1	–	27	–	4	–	48	4	–
–	–	–	–	–	–	3	–	3	–	–	–	18	–	–
1	–	–	–	–	–	1	–	1	–	–	–	5	–	1
1	–	–	–	1	–	–	–	–	–	–	–	4	–	–
–	–	–	1	1	–	–	–	3	–	1	–	22	1	–
1	–	–	–	–	–	–	–	–	–	–	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	13	–	–
–	–	–	–	2	–	1	–	2	–	1	–	63	–	–
1	–	–	–	–	–	4	–	–	–	–	–	7	–	–
–	–	–	–	–	–	–	–	–	–	13	–	13	–	–
–	–	–	–	3	–	3	–	–	–	–	–	12	–	1
–	–	–	–	1	–	1	–	2	–	3	19	97	94	–
–	–	–	–	–	–	–	–	–	–	–	–	3	–	–
–	–	–	–	–	–	–	–	–	–	1	–	3	–	–
7	–	–	–	4	–	27	–	23	–	23	–	196	1	1
5	–	–	–	–	–	1	–	1	–	2	–	26	–	–
1	–	–	–	–	–	2	–	2	–	–	–	9	–	1
–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	4	–	–
1	–	–	–	–	–	–	–	2	10	–	–	4	18	–
2	–	–	–	–	–	–	–	–	8	–	–	5	8	–
–	–	–	–	–	–	–	–	8	1	–	–	16	1	–
5	–	–	–	2	–	5	–	35	15	–	–	124	40	–
–	–	–	–	1	–	1	–	–	1	–	–	12	1	–
–	–	–	–	–	–	–	–	–	–	1	–	2	–	–
–	–	–	–	–	–	1	–	–	–	1	–	3	–	1
–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	3	–	–
1	–	–	–	2	–	–	–	2	–	–	–	12	–	2
–	–	–	–	1	–	–	–	–	–	2	–	5	–	–
1	–	–	–	11	–	11	–	5	–	7	2	74	12	–
2	–	–	–	–	–	2	–	7	–	–	–	14	–	1
2	–	–	1	1	–	–	–	3	–	1	–	11	10	–
1	–	–	–	2	–	–	–	4	–	4	4	40	45	–

CONSOLIDATED SUR

	Banes Division		Chiriqui Land Co.		Colombia Division		Cia. Bananer Costa Rica	
	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp Disp
MUSCLES AND TENDONS, OPERATIONS ON:								
Tenorrhaphy	2	–	–	–	2	–	4	–
Others	–	–	–	–	–	–	–	–
RECTUM, OPERATIONS ON:								
Fistula in ano	4	–	–	–	11	–	1	–
Hemorrhoids	6	–	4	–	19	–	3	–
Ischiorectal abscess	–	–	–	–	2	–	3	–
Prolapsus recti	–	–	–	–	–	–	1	–
Others	1	–	1	–	9	–	2	–
MISCELLANEOUS:								
Abscesses, treatment of	52	237	88	246	109	411	141	126
Aneurism, operation for	–	5	–	1	1	–	–	–
Blood transfusions	3	–	–	–	–	–	–	–
Carbuncles, treatment of	6	88	9	48	15	203	6	39
Cysts	2	20	1	–	16	14	3	3
Elephantiasis, treatment of	–	–	–	–	1	–	–	–
Fistulous tracts	–	–	–	–	4	1	6	2
Nails, extirpation of	–	2	1	–	5	25	2	5
Neoplasm, excision of, benign	3	–	–	–	5	–	1	–
Neoplasm, excision of, malignant	1	1	–	–	1	–	1	–
Plastic operations for severe injuries	–	–	–	–	–	–	–	–
Plastic operations for effects of disease	–	–	–	–	–	–	–	–
Plastic operations for congenital defect	1	–	–	–	–	–	–	–
Removal of foreign body	1	8	8	29	3	9	2	8
Skin graft	–	–	1	–	–	–	3	–
Snake bite, treatment of	–	–	9	–	–	–	3	2
Thyroidectomy	2	–	–	–	–	–	–	–
Ulcers, treatment of	20	47	164	445	4	–	91	1,598
Varicose veins, treatment of	1	6	–	3	5	–	1	–
Wounds, gunshot	2	–	–	–	6	1	9	4
Wounds, scalds and burns	12	67	3	31	–	–	6	21
Wounds, stab	3	–	11	43	3	–	6	1
Wounds, others	177	950	140	818	10	12	91	320
Various other minor operations	2	–	480	421	32	41	24	281
Various other major operations	–	–	–	–	1	6	–	–
EAR, OPERATIONS ON:								
Abscess, incision of	–	1	–	3	2	–	3	1
Mastoid operations	1	–	–	–	1	–	1	–
Paracentesis of membrane tympani	–	–	1	–	–	–	–	1
Removal of foreign body	–	2	–	6	–	–	–	1
Others	–	–	–	6	–	–	–	–
EYE, OPERATIONS ON:								
Abscess, incision of	–	–	–	–	1	–	–	–
Cataract, extraction of	–	–	–	–	–	–	–	–
Chalazion, excision of	–	2	–	–	–	–	–	–
Enucleation	3	–	–	–	2	–	–	–
Hordeolum	–	–	1	1	–	4	1	2
Lid operations	–	–	–	–	2	–	–	3
Pterygium, excision of	–	–	–	–	–	–	1	–
Pterygium, transplantation of	–	–	1	–	–	–	–	–
Removal of foreign body	3	40	1	22	–	25	2	8
Others	–	–	–	–	1	–	3	1
NOSE AND THROAT, OPERATIONS ON:								
Adeno-tonsillectomy	12	–	1	1	–	–	4	–
Peritonsillar abscess, incision of	–	–	–	–	4	–	1	1
Removal of polypi	3	–	–	–	–	1	1	–

CAL REPORT—*Continued*

Guatemala Division		Jamaica Division		Panama Division		Preston Division		Tela Railroad		Truxillo Railroad		Totals		Post-Operative Deaths
Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	
13	–	–	–	1	–	–	–	1	–	–	–	23	–	1
2	–	–	–	–	–	2	–	–	–	–	–	4	–	–
1	–	–	–	–	–	3	–	3	–	–	–	23	–	–
3	–	–	4	2	–	10	–	6	–	5	–	58	4	1
3	–	–	–	–	–	1	–	–	–	4	–	13	–	–
–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
1	–	–	–	–	–	2	–	–	–	2	–	18	–	1
56	105	–	102	22	12	63	323	134	219	207	404	872	2,185	3
–	–	–	–	–	–	–	–	–	–	–	–	1	6	–
–	–	–	–	–	–	–	–	–	–	–	–	3	–	–
4	13	–	3	7	–	6	11	2	34	10	1	65	440	–
1	–	–	–	–	4	5	–	–	–	1	4	29	45	–
–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
4	–	–	–	–	–	–	–	3	11	–	–	17	14	–
2	–	–	16	–	–	2	–	2	4	–	8	14	60	–
6	–	–	–	–	–	2	–	8	–	7	5	32	5	–
1	–	–	–	–	–	–	–	1	–	1	–	6	1	–
7	–	–	–	–	–	1	–	–	–	1	1	9	1	–
–	–	–	–	–	–	–	–	–	–	1	–	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
2	2	–	6	2	2	1	7	8	8	2	7	29	86	–
1	–	–	8	–	–	–	–	1	–	69	–	75	8	–
–	2	–	–	–	–	–	–	–	–	1	1	13	5	–
3	–	–	3	–	–	–	–	–	–	–	–	5	3	–
110	207	–	44	–	–	24	126	7	108	137	144	557	2,719	–
–	–	–	–	–	–	–	–	1	–	–	–	8	9	–
1	18	–	–	–	–	1	–	39	26	31	–	89	49	1
2	6	–	17	–	–	8	50	8	49	20	16	59	257	–
7	23	–	11	–	–	–	–	14	19	1	–	45	97	–
9	58	–	169	19	3	382	1,526	82	183	145	124	1,055	4,163	2
1	3	–	7	39	20	3	–	96	65	10	39	687	877	–
–	–	–	–	–	–	–	–	–	–	–	–	1	6	–
–	–	–	1	1	–	–	–	–	10	1	2	7	18	–
2	–	–	–	–	–	–	–	–	–	2	–	7	–	–
–	–	–	–	–	–	–	–	8	–	1	–	10	1	–
–	–	–	8	–	1	–	1	4	63	–	2	4	84	–
17	21	–	–	–	–	–	–	2	–	1	–	20	27	–
–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
–	–	–	–	–	–	1	–	1	–	–	4	2	4	–
1	–	–	–	–	–	–	–	6	–	1	6	8	8	–
–	–	–	–	–	–	2	–	4	–	–	–	11	–	–
1	–	–	2	–	–	–	–	1	–	1	–	5	9	–
–	–	–	–	–	1	–	–	5	–	–	1	7	5	–
–	–	–	–	2	–	–	–	2	–	–	–	5	–	–
–	–	–	–	1	–	–	–	12	–	–	1	14	1	–
–	2	–	10	–	2	5	52	26	103	1	–	38	264	–
–	5	–	–	–	–	–	–	18	–	6	10	28	16	–
6	–	–	–	–	–	34	–	17	–	1	–	75	1	–
–	–	–	–	3	–	–	–	–	–	2	1	10	2	–
1	–	–	–	–	–	–	–	–	–	–	–	5	1	–

CONSOLIDATED SURGI

	Banes Division		Chiriqui Land Co.		Colombia Division		Cia. Bananera Costa Rica	
	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.
NOSE AND THROAT, OPERATIONS ON—*Concluded:*								
Sinus operations	2	–	–	–	–	–	–	2
Thyroidectomy	1	–	–	–	–	–	–	–
Tonsillectomy	45	–	4	–	15	–	18	–
Tracheotomy	2	–	–	–	–	–	–	–
Others	2	–	–	–	–	–	4	2
SUB-TOTALS	685	1,513	1,114	2,300	896	774	707	2,457
Injections, intravenous	188	240	146	369	1,815	502	2,035	1,135
Tooth extractions	28	174	11	106	72	410	43	34
Vaccinations	–	5,080	–	502	–	–	176	1,081
TOTALS	901	7,007	1,271	3,277	2,783	1,686	2,961	4,707

* NOTE.—Including 782 intravenous injections which were not recorded in the table entitled "Record of Hospitals."

CAL REPORT—*Concluded*

Guatemala Division		Jamaica Division		Panama Division		Preston Division		Tela Railroad		Truxillo Railroad		Totals		Post-Operative Deaths
Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	Hosp.	Hosp. Disp.	
–	–	–	–	–	–	–	–	–	–	–	–	2	2	–
–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
8	–	5	–	3	–	29	–	9	–	4	–	140	–	–
4	–	–	–	–	–	–	–	–	–	–	–	6	–	–
–	–	–	–	–	–	1	1	2	8	1	–	10	11	–
461	465	5	432	182	46	950	2,128	999	969	926	818	6,925	11,902	53
802*	134	–	–	68	949	451	7	754	337	476	422	6,735	4,095	–
96	75	–	86	16	81	44	83	54	19	42	89	406	1,157	–
–	–	–	1,570	1	69	–	–	–	37	–	345	177	8,684	–
1359	674	5	2,088	267	1,145	1,445	2,218	1,807	1,362	1,444	1,674	14,243	25,838	53

CONSOLIDATED

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica			
	Hosp.		Hosp. Disp.		Hosp.		Hosp. Disp.		Hosp.		Hosp. Disp.		Hosp.		Hosp. Disp.	
	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.
BLOOD EXAMINATIONS:																
Total examinations	2200	–	5715	–	2315	–	6945	–	9881	–	809	–	7212	–	10154	–
Leucocyte enumerations	259	–	30	–	116	–	34	–	301	–	34	–	350	–	92	–
Differential leucocyte counts	70	–	9	–	63	–	28	–	187	–	34	–	120	–	40	–
Erythrocyte enumerations	12	–	17	–	11	–	14	–	70	–	15	–	114	–	54	–
Hemoglobin estimations	189	–	68	–	317	–	147	–	4578	–	339	–	2846	–	566	–
Malaria:	1511	–	5581	–	1803	–	6721	–	4622	–	353	–	3600	–	9374	–
(a) Estivo-autumnal	–	122	–	259	–	398	–	666	–	677	–	20	–	638	–	1111
(b) Tertian	–	6	–	11	–	337	–	706	–	200	–	6	–	4	–	40
(c) Quartan	–	1	–	–	–	2	–	10	–	17	–	1	–	–	–	3
(d) Mixed infection	–	–	–	–	–	1	–	14	–	7	–	–	–	–	–	–
Filaria	1	1	–	–	–	–	–	–	28	–	1	–	18	18	2	1
Sugar	–	–	–	–	–	–	–	–	–	–	–	–	5	2	2	–
Widal tests	85	38	5	1	5	–	–	–	49	13	10	2	81	14	1	–
Other examinations	73	–	5	–	–	–	1	–	46	–	23	–	78	8	23	–
URINE EXAMINATIONS:																
Total examinations	1869	–	849	–	1897	–	210	–	4637	–	1327	–	3616	–	708	–
Albumin	–	467	–	108	–	883	–	56	–	1889	–	242	–	2442	–	280
Casts	–	187	–	17	–	709	–	40	–	1418	–	122	–	1892	–	187
Pus	–	366	–	92	–	490	–	77	–	2131	–	542	–	3392	–	654
Blood	–	129	–	21	–	126	–	15	–	1348	–	269	–	371	–	37
Sugar	–	6	–	14	–	–	–	1	–	8	–	51	–	133	–	17
Hemoglobin	3	3	–	–	–	67	–	–	–	3	–	–	–	48	–	–
Gonococci	–	–	–	–	–	–	–	–	–	4	–	10	–	6	–	–
B. tuberculosis	–	–	–	–	–	1	–	–	–	1	–	1	–	1	–	–
Other examinations	6	6	–	–	–	–	–	–	120	76	57	43	–	149	–	37
SPUTUM EXAMINATIONS:																
Total examinations	76	–	12	–	224	–	21	–	350	–	104	–	821	–	58	–
B. tuberculosis	–	8	–	–	224	32	21	3	–	53	–	31	–	73	–	14
Pus	–	–	–	–	–	–	–	–	–	335	–	99	–	801	–	5
Blood	–	4	–	–	–	–	–	–	–	23	–	4	–	47	–	
Other examinations	–	–	–	–	–	–	–	–	9	1	–	–	–	1	–	–
STOOL EXAMINATIONS:																
Total examinations	1211	–	869	–	1796	–	160	–	2386	–	1117	–	2809	–	497	–
Uncinaria	–	76	–	125	–	504	–	52	–	1359	–	115	–	1119	–	2
Trichuris	–	147	–	267	–	237	–	36	–	810	–	192	–	574	–	7
Ascaris	–	74	–	161	–	298	–	20	–	300	–	61	–	526	–	8
Oxyuris vermicularis	–	1	–	1	–	1	–	–	–	–	–	–	–	–	–	–
Strongyloides stercoralis	–	17	–	36	–	94	–	6	–	193	–	63	–	124	–	1
Tenia saginata	–	9	–	5	–	–	–	–	–	1	–	2	–	1	–	
Tenia solium	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other tape-worms	–	–	–	–	–	9	–	–	–	5	–	6	–	5	–	
Entameba histolytica	–	2	–	–	–	39	–	1	–	845	–	486	–	115	–	4
Other entamebae	–	5	–	4	–	–	–	–	–	160	–	127	–	212	–	5
Balantidium coli	–	3	–	2	–	–	–	–	–	9	–	4	–	1	–	
Flagellates, intestinal	–	7	–	–	–	29	–	4	–	646	–	347	–	240	–	6
Blood	–	13	–	9	–	8	–	1	–	113	–	54	–	133	–	4
Pus	–	17	–	9	–	–	–	–	–	115	–	54	–	196	–	5
Other examinations	–	3	–	–	–	–	–	–	–	–	–	–	–	246	–	6
MISCELLANEOUS SMEARS:																
Total examinations	29	–	38	–	29	–	269	–	231	–	277	–	489	–	177	
Eye	2	1	1	–	8	2	3	–	32	23	17	13	24	5	4	

LABORATORY REPORT

Guatemala Division				Jamaica Division				Panama Division				Preston Division				Tela Railroad				Truxillo Railroad			
Hosp.		Hosp. Disp.		Hosp.		Hosp. Disp.		Hosp.		Hosp. Disp.		Hosp.		Hosp. Disp.		Hosp.		Hosp. Disp.		Hosp.		Hosp. Disp.	
Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.
4305	–	6606	–	19	–	2860	–	1652	–	1133	–	2679	–	2197	–	5578	–	9629	–	6746	–	4847	–
412	–	2	–	1	–	11	–	137	–	57	–	247	–	19	–	420	–	175	–	300	–	58	–
410	–	3	–	2	–	10	–	41	–	22	–	66	–	6	–	227	–	51	–	295	–	65	–
335	–	3	–	–	–	6	–	13	–	21	–	27	–	7	–	17	–	10	–	84	–	11	–
346	–	3	–	2	–	11	–	686	–	43	–	180	–	48	–	307	–	345	–	152	–	42	–
2494	–	6595	–	14	–	2822	–	763	–	977	–	2123	–	7117	–	4465	–	9005	–	5913	–	4671	–
–	616	–	541	–	5	–	257	–	191	–	272	–	118	–	831	–	863	–	637	–	1640	–	984
–	292	–	749	–	5	–	82	–	5	–	14	–	13	–	54	–	191	–	215	–	204	–	147
–	27	–	66	–	–	–	29	–	4	–	10	–	–	–	2	–	34	–	20	–	11	–	2
–	141	–	145	–	–	–	–	–	1	–	2	–	–	–	–	–	22	–	17	–	109	–	56
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	1	–	–
94	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8	–	8	–	–	–	–	–
105	15	–	–	–	–	–	–	6	–	–	–	36	11	–	–	122	19	20	–	–	–	–	–
109	–	–	–	–	–	–	–	6	–	13	–	–	–	–	–	12	–	15	3	–	–	–	–
4660	–	223	–	7	–	446	–	1210	–	454	–	2157	–	560	–	4562	–	1295	–	4262	–	670	–
–	1185	–	51	–	3	–	55	1210	658	454	109	–	270	–	80	–	1142	–	138	–	2680	–	322
–	846	–	25	–	–	–	4	1210	632	454	134	–	139	–	40	–	761	–	74	–	988	–	32
–	1482	–	71	–	–	–	21	1210	1196	454	391	–	189	–	53	–	728	–	171	–	3636	–	576
–	51	–	1	–	–	–	–	1210	71	454	26	–	35	–	6	–	187	–	33	–	558	–	70
–	29	–	22	–	–	–	59	26	21	6	6	–	21	–	7	–	7	–	10	–	–	–	3
–	55	–	1	–	–	–	–	22	22	1	1	–	–	–	–	–	11	–	1	–	38	–	–
–	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	–	19	–	10	–	–	–	–
–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	4	–	–	–	–	–	–
195	60	–	–	–	1	41	16	18	15	13	11	5	5	–	–	–	29	–	3	–	734	–	79
554	–	44	–	3	–	5	–	68	–	12	–	80	–	20	–	422	–	78	–	711	–	21	–
–	99	–	3	–	–	–	–	68	9	12	2	–	12	–	2	–	61	–	16	–	117	–	9
–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	7	–	1	–	–	–	–
–	–	–	–	–	1	–	–	–	–	–	–	–	11	–	2	–	–	–	–	–	–	–	–
12	6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
4668	–	235	–	1	–	80	–	568	–	197	–	598	–	151	–	3930	–	1467	–	4143	–	198	–
–	1486	–	67	–	–	–	4	568	124	197	50	–	46	–	6	–	1864	–	287	–	2183	–	50
–	812	–	43	–	–	–	–	568	236	197	98	–	85	–	42	–	1839	–	760	–	2143	–	84
–	806	–	43	–	–	–	5	568	22	197	33	–	17	–	7	–	1674	–	643	–	1033	–	45
–	7	–	–	–	–	–	–	568	3	197	3	–	2	–	–	–	–	–	–	–	9	–	1
–	141	–	9	–	–	–	–	568	15	197	8	–	25	–	7	–	225	–	73	–	–	–	–
–	3	–	2	–	–	–	–	568	–	197	–	–	4	–	–	–	17	–	2	–	1	–	–
–	4	–	–	–	–	–	–	568	–	197	–	–	–	–	–	–	–	–	–	–	5	–	–
–	–	–	1	–	–	–	–	568	–	197	–	–	–	–	–	–	5	–	2	–	7	–	4
–	141	–	1	–	–	–	–	11	7	2	–	–	12	–	–	–	175	–	66	–	61	–	1
–	18	–	–	–	–	–	–	568	–	197	–	–	6	–	–	–	332	–	96	–	–	–	–
–	5	–	4	–	–	–	–	568	–	197	–	–	–	–	–	–	15	–	7	–	7	–	–
–	109	–	14	–	–	–	–	568	12	197	–	–	9	–	–	–	232	–	88	–	49	–	1
–	138	–	9	–	1	–	4	568	12	197	3	–	22	–	3	–	150	–	39	–	258	–	8
–	435	–	29	–	–	–	–	568	20	197	5	–	35	–	4	–	50	–	16	–	253	–	7
–	71	–	1	–	–	–	–	–	–	–	–	31	22	2	2	–	470	–	159	–	197	–	5
400	–	80	–	–	–	1	–	32	–	83	–	74	–	36	–	269	–	303	–	111	–	274	–
104	72	12	11	–	–	–	–	2	–	4	–	18	11	1	1	49	31	36	22	–	–	3	3

CONSOLIDATED

	Banes Division				Chiriqui Land Co.				Colombia Division				Cia. Bananera Costa Rica			
	Hosp.		Hosp. Disp.		Hosp.		Hosp. Disp.		Hosp.		Hosp. Disp.		Hosp.		Hosp. Disp.	
	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.
MISCELLANEOUS SMEARS —Concluded																
Throat	5	2	6	1	–	–	4	2	11	9	12	9	16	7	7	5
Gums and mouth	–	–	–	–	1	–	–	–	5	3	7	5	–	–	–	–
Nose	–	–	2	1	1	–	–	–	17	1	8	–	8	1	9	–
Ear	–	–	–	–	–	–	1	–	1	–	–	–	–	–	–	–
Genital source (gonococcus)	18	7	29	12	15	10	258	124	102	46	216	95	263	138	124	55
Cutaneous ulcer	1	–	–	–	4	–	–	–	23	2	8	4	–	–	–	–
Other smears	3	–	–	–	–	–	3	–	40	9	9	1	178	43	33	6
EXAMINATION FOR SYPHILIS:																
Total examinations	174	–	182	–	432	–	416	–	2465	–	1332	–	2776	–	664	–
Complement fix. test (blood)	–	–	–	–	–	–	–	–	1200	409	653	170	1098	345	215	67
Flocculation test (blood)	174	56	181	33	419	151	400	148	1207	462	653	175	1647	724	443	163
Dark-field examination	–	–	1	–	8	1	15	2	20	5	25	3	27	9	6	3
Spinal-fluid test	–	–	–	–	5	1	1	1	38	3	1	–	4	3	–	–
CULTURES:																
Total examinations	14	–	1	–	8	–	1	–	139	–	20	–	219	–	12	–
Blood	14	5	–	–	6	–	–	–	56	11	3	2	76	11	2	–
Urine	–	–	–	–	–	–	–	–	33	24	2	2	51	19	3	2
Sputum	–	–	–	–	–	–	–	–	–	–	–	–	4	3	–	–
Stool	–	–	–	–	1	–	–	–	26	1	3	–	57	5	1	–
Fluid from joint	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Spinal fluid	–	–	–	–	1	–	–	–	2	2	–	–	2	–	–	–
Pleural fluid	–	–	–	–	–	–	–	–	1	1	–	–	3	1	–	–
Throat	–	–	1	1	–	–	–	–	9	4	9	3	10	–	5	–
Other sources	–	–	–	–	–	–	1	1	12	7	3	3	15	8	1	–
Autopsy sources	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–
MISCELLANEOUS:																
Total examinations	10	–	–	–	9	–	2	–	114	–	20	–	33	–	–	–
Autopsies performed	4	–	–	–	4	–	–	–	–	–	–	–	17	–	–	–
Embalmings	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Surgical tissues reported	6	–	–	–	–	–	–	–	19	–	1	–	–	–	–	–
Reports of progress on special problems	–	–	–	–	–	–	2	–	14	–	–	–	–	–	–	–
Number of x-ray examinations	119	–	–	–	101	–	35	–	596	–	198	–	520	–	–	–
Other examinations	–	–	–	–	5	–	–	–	95	24	19	1	16	3	–	–

NOTE.—The examinations made during malaria blood surveys, and positive findings, are included in the section entitled "Blood Examinations," under "Hosp. Disp.," as they were not reported separately by all Divisions.

LABORATORY REPORT—*Concluded*

Guatemala Division				Jamaica Division				Panama Division				Preston Division				Tela Railroad				Truxillo Railroad			
Hosp.		Hosp. Disp.		Hosp.		Hosp. Disp.		Hosp.		Hosp. Disp.		Hosp.		Hosp. Disp.		Hosp.		Hosp. Disp.		Hosp.		Hosp. Disp.	
Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.	Total	Pos.
12	1	1	–	–	–	–	–	1	1	6	–	7	2	–	–	1	–	3	–	–	–	2	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	6	3	–	–	4	4
13	–	–	–	–	–	–	–	–	–	1	–	6	–	1	1	–	–	5	4	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
257	188	67	42	–	–	1	1	27	11	55	31	34	25	33	23	170	52	227	48	99	48	261	102
12	7	–	–	–	–	–	–	2	1	15	1	2	–	–	–	4	2	26	12	–	–	–	–
2	2	–	–	–	–	–	–	–	–	2	1	7	6	1	–	44	22	–	–	12	10	4	3
448	–	76	–	–	–	–	–	87	–	309	–	304	–	150	–	1766	–	1219	–	1115	–	281	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
408	130	71	27	–	–	–	–	78	44	308	195	296	110	150	34	1762	362	1213	240	1114	138	278	56
23	16	5	3	–	–	–	–	–	–	1	1	8	4	–	–	–	–	6	–	–	–	3	1
17	9	–	–	–	–	–	–	9	2	–	–	–	–	–	–	4	2	–	–	–	–	–	–
18	–	6	–	–	–	–	–	–	–	–	–	38	–	–	–	181	–	87	–	9	–	1	–
9	5	–	–	–	–	–	–	–	–	–	–	35	14	–	–	77	16	19	–	2	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	45	35	4	4	1	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	38	8	29	2	–	–	–	–
2	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	2	–	–	–	–	–	–
2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	1	–	–	–	–	–	–
1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–
2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8	–	34	3	–	–	–	–
1	1	6	5	–	–	–	–	–	–	–	–	3	–	–	–	3	3	1	–	–	–	1	1
1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6	2	–	–
22	–	–	–	–	–	–	–	17	–	–	–	45	–	–	–	33	–	6	–	45	–	1	–
22	–	–	–	–	–	–	–	1	–	–	–	37	–	–	–	15	–	–	–	36	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	3	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	8	–	–	–	12	–	1	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
535	–	19	–	–	–	–	–	50	–	25	–	486	–	–	–	632	–	–	–	255	–	–	–
–	–	–	–	–	–	–	–	16	6	–	–	–	–	–	–	3	1	5	1	6	3	1	–

NUMBER AND CLASSIFICATION OF X-RAY EXAMINATIONS*

Nature of Examination	Banes Division		Chiriqui Land Co.		Colombia Division		Cia. Bananera Costa Rica		Guatemala Division		Jamaica Division		Panama Division		Preston Division		Tela Railroad		Truxillo Railroad		Totals*	
	Number of Examinations	Plates and Films Used	Number of Examinations	Plates and Films Used	Number of Examinations	Plates and Films Used	Number of Examinations	Plates and Films Used	Number of Examinations	Plates and Films Used	Number of Examinations	Plates and Films Used	Number of Examinations	Plates and Films Used	Number of Examinations	Plates and Films Used	Number of Examinations	Plates and Films Used	Number of Examinations	Plates and Films Used	Number of Examinations	Plates and Films Used
Vertebral column	–	–	5	11	20	22	13	20	16	16	–	–	–	–	8	15	5	?	12	14	79	98
Skull	–	–	5	11	43	46	30	33	18	22	–	–	3	3	15	18	4	?	5	5	123	138
Sternum	–	–	–	–	1	1	1	2	1	1	–	–	–	–	3	3	–	–	1	1	7	8
Hyoid bone	–	–	–	–	–	–	–	–	3	3	–	–	–	–	–	–	–	–	–	–	3	3
Ribs	4	4	11	12	9	9	18	19	22	22	–	–	–	–	10	11	1	?	1	1	76	78
Upper limbs	34	34	34	41	91	91	85	107	120	129	–	–	15	18	110	131	43	?	42	47	574	598
Lower limbs	38	38	47	57	96	104	166	188	128	135	–	–	37	42	104	121	51	?	65	71	732	756
Neck	–	–	–	–	3	3	1	2	5	7	–	–	–	–	1	3	–	–	–	–	10	15
Teeth	1	1	7	7	21	29	36	56	10	26	–	–	3	7	43	82	–	–	22	28	143	236
Heart	–	–	2	2	39	28	7	7	19	19	–	–	–	–	10	10	246	?	1	1	324	67
Lungs	37	37	21	22	322	235	77	82	154	156	–	–	13	14	116	117	247	?	32	33	1,019	696
Liver	–	–	–	–	18	19	1	2	5	5	–	–	–	–	13	25	–	–	–	–	37	51
Spleen	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	–	–	–	–	1	1
Kidney	2	2	2	5	24	28	17	26	23	24	–	–	2	9	11	20	7	?	–	–	88	114
Gastrointestinal tract	–	–	–	–	67	74	7	6	18	54	–	–	–	–	36	92	22	?	5	15	155	241
Pelvic organs	–	–	–	–	16	16	28	35	4	4	–	–	2	2	5	5	3	?	9	9	67	71
Miscellaneous	3	3	2	4	24	25	32	19	8	8	–	–	–	–	1	1	3	?	60	1	133	61
TOTALS	119	119	136	172	794	730	520	605	554	631	–	–	75	95	486	654	632	?	255	226	3,571	3,232

* NOTE.—The figures appearing in the "Totals" column, under the heading "Plates and Films Used," are incomplete, inasmuch as the Tela Railroad Company's Medical Department has not supplied data in their reports to record the number of plates and films used in the Tela Hospital in examining the respective organs. Fluoroscopic examinations are included in the columns entitled "Number of Examinations." No x-ray apparatus has been installed in the Jamaica Division, as the Company has no Hospital there.

METEOROLOGICAL REPORT

AVERAGE TOTAL RAINFALL (INCHES)

MONTH:	Banes Division	Chiriqui Land Co.	Colombia Division	Cia. Bananera Costa Rica	Guatemala Division	Jamaica Division	Panama Division	Preston Division	Tela Railroad	Truxillo Railroad	Average for All Divisions
January	1.75	.73	.00	4.32	7.23	2.67	2.73	2.06	5.98	8.85	3.63
February	3.60	2.45	.01	1.86	2.70	3.41	1.01	5.54	3.19	4.85	2.86
March	.89	1.90	.63	2.81	4.87	.93	2.88	1.01	2.08	2.06	2.01
April	7.47	7.38	3.21	5.22	6.86	4.30	3.78	10.12	3.84	3.94	5.61
May	5.21	7.57	3.16	9.06	6.93	2.61	8.68	6.58	5.49	2.49	5.78
June	2.08	6.06	4.48	8.25	11.80	4.09	6.31	1.94	7.42	6.33	5.88
July	1.70	11.97	2.28	27.76	14.59	3.88	21.33	3.25	6.95	10.20	10.39
August	3.19	16.95	3.97	21.08	8.81	2.16	20.25	3.74	8.91	6.86	9.59
September	2.03	12.99	4.71	9.84	13.18	3.44	9.71	2.76	4.93	5.54	6.91
October	5.53	21.22	6.16	7.26	13.27	5.83	2.43	6.57	8.98	6.42	8.37
November	5.27	2.65	.50	12.73	6.71	7.90	4.92	4.66	10.50	12.03	6.79
December	3.33	2.87	.10	10.28	7.85	2.90	7.34	2.33	5.37	11.76	5.41
TOTALS	42.05	94.74	29.21	120.47	104.80	44.12	91.37	50.56	73.64	81.33	73.23

MEAN TEMPERATURE (FAHRENHEIT)

MONTH:	Banes Division	Chiriqui Land Co.	Colombia Division	Cia. Bananera Costa Rica	Guatemala Division	Jamaica Division	Panama Division	Preston Division	Tela Railroad	Truxillo Railroad	Average for All Divisions
January	68.50	76.00	79.50	69.00	74.00	69.50	77.00	71.50	75.50	75.50	73.60
February	71.50	78.50	80.00	75.50	78.50	70.50	76.00	71.00	74.50	77.00	75.30
March	72.00	79.00	81.00	76.00	81.50	69.50	78.00	71.50	79.50	77.50	76.55
April	78.00	80.00	82.00	72.00	78.00	70.50	78.00	75.50	76.00	77.50	76.75
May	78.50	80.50	82.50	74.50	82.50	71.50	79.00	75.00	81.00	82.00	78.70
June	80.50	82.00	79.50	75.00	83.00	74.00	80.50	76.50	79.50	80.50	79.10
July	80.50	84.00	82.50	72.00	81.50	74.00	82.00	76.00	74.50	79.50	78.65
August	81.00	79.50	82.50	74.50	82.50	76.50	76.50	79.00	78.00	81.00	79.10
September	80.00	81.00	82.50	74.50	83.00	75.00	81.50	76.00	79.00	80.50	79.30
October	77.50	78.50	81.00	74.50	81.50	74.00	82.50	76.50	80.50	82.50	78.90
November	73.00	80.00	81.00	72.50	75.00	70.50	82.00	70.50	78.00	80.50	76.30
December	71.00	81.50	80.50	72.00	73.50	69.00	81.50	67.00	74.50	76.50	74.70
Average maximum temperature	95.83	93.17	93.83	92.25	95.17	88.42	93.42	94.83	96.75	95.33	93.90
Average minimum temperature	56.17	66.92	68.58	57.25	63.91	55.67	65.50	52.83	58.33	63.08	60.82
Average mean temperature	76.00	80.04	81.21	74.75	79.54	72.04	79.46	73.83	77.54	79.21	77.36

GENERAL STATEMENT PASSENGER SERVICE

NEW YORK PASSENGER STEAMSHIPS

	Calamares	Carrillo	Metapan	Pastores	Santa Marta	Sixaola	Tivives	Toloa	Ulua	Zacapa	Total
Number of voyages made	13	14	13	12	12	14	13	13	14	13	131
Total number of officers, all voyages	323	281	261	294	243	284	261	322	340	262	2,871
Total number in crews, all voyages	1,326	949	878	1,151	807	957	881	1,274	1,376	879	10,478
Total number of ships' laborers, all voyages	188	293	233	225	201	279	267	193	252	221	2,352
Number of seamen given physical examination before "Signing-on"	1,328	949	879	1,142	807	958	880	1,272	1,369	881	10,465
Number of rejected applicants, "signing-on" day	5	–	2	–	–	1	1	3	3	3	18
Number of prospective passengers rejected at tropical ports	–	–	–	–	–	–	–	–	–	–	–
Number of cabin passengers carried	3,170	2,405	1,944	2,756	1,800	1,987	2,143	2,975	3,085	1,945	24,210
Number of deck passengers carried	343	1,169	424	357	428	516	979	382	354	471	5,423
OFFICERS, CREWS AND SHIPS' LABORERS:											
Total number of patients treated	518	214	154	150	230	172	136	285	359	369	2,587
Total number of treatments in office	1,196	427	219	332	355	225	208	523	620	744	4,849
Total number of treatments in quarters	67	8	11	53	35	41	47	84	53	31	430
PASSENGERS:											
Total number of patients treated	171	53	98	53	116	63	62	94	131	150	991
Total number of treatments in office	192	88	130	102	135	68	65	129	147	166	1,222
Total number of treatments in staterooms	99	30	60	123	49	49	54	102	84	88	738
Number of vaccinations	113	655	59	75	54	12	619	47	112	48	1,794
Number of persons detained by quarantine and immigration authorities	4	–	3	2	1	2	5	3	7	4	31
Number of deaths { Members of crews	–	–	–	–	–	–	–	–	–	–	–
Passengers	–	–	–	–	–	–	–	–	–	–	–

NEW ORLEANS PASSENGER STEAMSHIPS

	*Abangarez	Atenas	Cartago	Coppename	Heredia	Parismina	Tela	Toltec	Turrialba	Total
Number of voyages made	25	27	19	22	20	20	1	1	26	161
Total number of officers, all voyages	470	509	363	408	387	395	16	14	510	3,072
Total number in crews, all voyages	1,265	1,394	1,039	910	1,093	1,092	40	34	1,336	8,203
Total number of ships' laborers, all voyages	355	325	137	83	201	181	6	–	264	1,552
Number of seamen given physical examination before "signing-on"	1,251	1,387	1,039	911	1,087	1,089	41	–	1,347	8,152
Number of rejected applicants, "signing-on" day	10	8	9	12	2	8	1	–	12	62
Number of prospective passengers rejected at tropical ports	–	–	–	–	–	1	–	–	1	2
Number of cabin passengers carried	2,209	2,653	2,183	1,413	2,380	2,241	46	25	2,551	15,701
Number of deck passengers carried	90	273	129	210	176	187	–	46	276	1,387
OFFICERS, CREWS AND SHIPS' LABORERS:										
Total number of patients treated	665	433	366	278	390	322	20	5	477	2,956
Total number of treatments in office	931	491	434	344	501	401	23	25	651	3,801
Total number of treatments in quarters	74	20	15	33	23	61	11	–	24	261
PASSENGERS:										
Total number of patients treated	133	143	129	86	207	82	2	–	131	913
Total number of treatments in office	140	129	133	101	215	79	1	–	113	911
Total number of treatments in staterooms	78	59	49	41	76	57	5	–	62	427
Number of vaccinations	92	63	100	41	108	67	10	32	59	572
Number of persons detained by quarantine and immigration authorities	22	19	24	17	19	18	1	–	31	151
**Number of deaths: Members of crews	–	–	–	–	–	–	–	–	–	–
**Number of deaths: Passengers	–	–	–	–	1	–	–	–	–	1

* These records include one trip made between New Orleans, La., and New York, N. Y.; and one voyage beginning and ending at New York, N. Y.

** The death aboard a steamship of the New Orleans Division was caused by drowning.

*CLASSIFICATION OF DISEASES TREATED ABOARD PASSENGER STEAMSHIPS AND BY PORT MEDICAL OFFICERS AT NEW YORK, NEW ORLEANS AND BOSTON

	Steamships N. Y. Division		†Steamships N. O. Division		Port Med. Officer New York		Port Med. Officer New Orleans		Port Med. Officer Boston		Revere Sugar Refinery Boston	
	Crew	Pass.	Crew	Pass.	Emp.	Non-Emp.	Emp.	Non-Emp.	Emp.	Non-Emp.	Emp.	Non-Emp.
Epidemic, endemic or infectious diseases (Charts Nos. 1 to 42, incl.)	98	13	46	16	15	–	37	–	10	–	–	–
General diseases not included above (Charts Nos. 43 to 69, incl.)	60	20	30	15	12	–	4	2	3	–	2	–
Diseases of the nervous system and of the organs of special sense (Charts Nos. 70 to 86, incl.)	190	91	107	36	48	–	35	3	42	–	401	–
Diseases of the circulatory system (Charts Nos. 87 to 96, incl.)	54	35	4	4	13	–	16	2	4	–	10	–
Diseases of the respiratory system (Charts Nos. 97 to 107, incl.)	345	118	348	64	13	–	74	1	8	–	282	–
Diseases of the digestive system (Charts Nos. 108 to 127, incl.)	573	241	1,403	274	48	–	127	5	44	–	684	–
Non-venereal diseases of the genito-urinary system and its adnexa (Charts Nos. 128 to 142, incl.)	27	11	12	7	12	–	8	–	4	–	18	–
The puerperal state (Charts Nos. 143 to 150, incl.)	–	1	–	1	–	–	–	–	–	–	–	–
Diseases of the skin and of the cellular tissue (Charts Nos. 151 to 154, incl.)	130	37	245	69	89	1	71	3	53	–	119	–
Diseases of the bones and of the organs of locomotion (Charts Nos. 155 to 158, incl.)	174	65	32	8	11	–	23	1	21	–	86	–
Malformations (Chart No. 159)	–	–	–	–	–	–	–	–	–	–	–	–
Diseases of early infancy (Charts Nos. 160 to 163, incl.)	–	–	–	–	–	–	–	–	–	–	–	–
Old age (Chart No. 164)	–	–	–	–	–	–	–	–	–	–	–	–
External causes (Charts Nos. 165 to 203, incl.)	890	183	446	69	639	9	550	7	369	–	1,565	–
Ill-defined diseases (Charts Nos. 204 and 205)	46	176	283	350	5	–	483	3	–	–	–	–
TOTALS	2,587	991	2,956	913	905	10	1,428	27	558	–	3,167	–

* NOTE.—This table gives only cases treated, and does not show the number of treatments.

There were no cases of quarantinable diseases aboard our steamships during the year. There were no cases of trachoma; and 11 cases of venereal diseases among the passengers, and 73 cases of venereal diseases among members of the crews.

The chart numbers used are taken from the "International List of Causes of Sickness and Death." These chart numbers are used universally by public-health and city and state health departments and organizations.

† Including 8 members of crew and 4 passengers treated aboard the S. S. "Abangarez," during one voyage beginning and ending at New York, N. Y.

REPORT OF PORT MEDICAL OFFICERS AND SANITARY INSPECTOR

MEDICAL AND SURGICAL CASES TREATED

		Medical Cases			Surgical Cases			Totals	
		No. of Cases		No. of Treatments	No. of Cases		No. of Treatments	No. of Cases	No. of Treatments
		Emp.	Non-Emp.		Emp.	Non-Emp.			
New York		124	–	292	781	10	4,019	915	4,311
New Orleans		795	15	1,171	633	12	2,263	1,455	3,434
Boston	Long Wharf	189	–	281	369	–	742	558	1,023
	Revere Refinery	1,602	–	546	1,565	–	2,330	3,167	2,876
TOTALS		2,710	15	2,290	3,348	22	9,354	6,095	11,644

PHYSICAL EXAMINATION OF PROSPECTIVE EMPLOYEES

	Total No. Examined	Total No. Rejected	Per Cent Rejected
New York	711	103	14.49
New Orleans	598	51	8.53
Boston	231	22	9.52
TOTALS	1,540	176	11.43

PHYSICAL EXAMINATION OF MEMBERS OF CREWS

	Total No. Examined	Total No. Rejected	Per Cent Rejected
New York	13,766	70	.51
New Orleans	13,328	180	1.35
Boston	2,767	15	.54
TOTALS	29,861	265	.89

PHYSICAL CAUSES FOR REJECTION OF MEMBERS OF CREWS

	New York	New Orleans	Boston
Malaria, clinical	–	1	–
Syphilis, primary	–	13	–
Syphilis, secondary	–	1	–
Syphilis, period not specified	9	–	–
Soft chancre	4	20	2
Gonococcal infection, except that of the eye	6	106	3
Epilepsy	1	–	1
Diseases of the eye or its adnexa	4	–	–
Chronic diseases of the heart	1	–	–
Diseases of the veins	5	–	–
Diseases of the lymphatic system	–	4	–
Diseases of the teeth and gums	4	–	–
Hernia	25	27	7
Hydrocele	–	–	1
Other non-venereal diseases of the male genital organs	3	2	–
Scabies	–	3	–
Impetigo contagiosa	–	1	–
Other diseases of the skin and adnexa	3	2	–
Diseases of the bones or organs of locomotion	1	–	–
Old age	1	–	–
Injury by cutting or piercing instruments	1	–	–
External violence	–	–	1
No disease; malingering	2	–	–
TOTALS	70	180	15

VACCINATIONS

New York.	25
New Orleans.	618
Boston	30

FUMIGATION

	New York	New Orleans	Boston
Steamships fumigated throughout	45	63	12
Holds only	–	–	–
Superstructure only	–	–	–
Forward quarters	5	1	2
Aft quarters	3	–	5
Separate rooms	3	6	4

EXPLANATORY NOTES

Referring to the names of certain Divisions which do not include the name of the country where located, the following explanation is given: Banes and Preston Divisions are located in Cuba; the Tela Railroad Company and the Truxillo Railroad Company in Honduras; and the Chiriqui Land Company in Panama. The Cortes Development Company, whose medical activities are briefly enumerated on page 15, is located in Honduras.

The Medical Department in the Jamaica Division functions somewhat differently from those in the other Divisions. In Jamaica, employees and their dependents who are seriously ill receive treatments in hospitals operated by the Government. Hence, the medical attention furnished by the Company consists mainly of "first-aid" measures and dispensary service to persons suffering from minor ailments and injuries: although a relatively small number of serious cases among employees are hospitalized in a ward of a few beds reserved by the Company in one of the local hospitals, where they receive professional care from the Company's medical staff. For the reasons mentioned above, the Jamaica Division records very low morbidity and mortality rates for employees—in consequence, the Division is not included in tables showing morbidity, mortality and fatality rates, disease incidence, and other vital statistics; and in some tables the disease incidence in that Division is not shown separately, although included in the tables.

Hospital Dispensaries are clinics in charge of physicians, where ambulatory cases are given medical and surgical attention. In most instances they are in the Hospital or immediately adjoining it; but some of them are situated in outlying parts of the plantations where a large number of people are congregated.

Field Dispensaries are in charge of Dispensers, who are located in more or less isolated sections of the plantations. They treat minor ailments or injuries of ambulatory patients, and render first-aid treatment to more serious cases until they can be transported to the Hospital.

The term "Employees" includes all persons appearing on our payrolls, including laborers and others employed on a part-time or hourly basis.

The term "Non-Employees" includes all persons formerly indicated by the classifications "Members of Families of Employees" and "Other Non-Employees" —i.e., all persons not included in the term "Employees."

The chart numbers referred to in some of the tables are taken from the "International List of the Causes of Sickness and Death." These chart numbers are used universally by public-health and city and state health departments and organizations.

A list of abbreviations as used in the tables in Section VI—with their meanings is given herewith:

M.—Male
F.—Female
T.—White persons born in temperate zones
O.—All persons other than "white persons born in temperate zones"
Emp.—Employee
Non-Emp.—Non-Employee
Pass.—Passenger
Pos.—Positive
N. Y.—New York
N. O.—New Orleans

It will be noted that dependents are separated into two groups—(1) White persons born in temperate zones, and (2) "Others." The latter group includes all individuals, *irrespective of color or race,* except white people with nativity in temperate zones. This method affords an opportunity to determine the effects of climatic conditions on white people born in temperate zones and residing in a tropical climate. The term "Others" has no racial significance; and that classification includes children born in the tropics, whose parents are considered as "White persons born in temperate zones."

SPECIAL COMMENT

The author of each paper is afforded an opportunity to give free expression to his own ideas on the subject of the article, and it is understood that he is solely responsible for the opinions expressed and the statements made therein.

HUC